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ABSTRACT

Focusing on the occupational cluster of natural resources, this unit entitled "Forestry Workers" is one of four grade 4 units which are part of a total set of twenty-seven career development curriculum units for grades K-6. This unit is organized into four sections. Section I identifies two career development-centered curriculum (CDCC) elements (e.g., realistic self-concept formulation), four career development themes (e.g., the student will understand the relationship of his/her interests, aptitudes, and achievements to career goal realization), five unit goals (e.g., the student will understand how his/her interests relate to forestry work), and five unit performance objectives (e.g., the student will compare how his/her interests relate to forestry work by completing a self-inventory checklist). Also included in Section I are evaluation procedures for a pre- and post-assessment, three student evaluation sheets, answer keys, and evaluation tabulation forms. Section II describes teaching strategies for six unit subtopics (capsules) and includes suggested resources for teaching each one. Capsule topics include silviculture, insects and disease, fire, and surveying. Section III contains nine teacher reference sheets and section IV contains twenty-five student activity sheets. (JH)

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Suggested for
Grade 4

FORESTRY WORKERS

one in a series
of

CAREER DEVELOPMENT CURRICULUM UNITS

for the
Elementary Classroom

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CE 020 091

CDCC Project
ESEA Title III
Coloma Community Schools
P.O. Box 218
Coloma, Michigan 49038

FORESTRY WORKERS

Grade 4

(Third Edition)

one in a series
of

CAREER DEVELOPMENT CURRICULUM UNITS

for the

ELEMENTARY CLASSROOM

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CAREER DEVELOPMENT CENTERED CURRICULUM PROJECT

ESEA TITLE III

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FOREWORD

The series "Career Development Curriculum Units for the Elementary Classroom" represents the outcome of three and one-half years of effort on the part of many individuals within Coloma Community Schools. The work was completed under an ESEA Title III project entitled "Career Development Centered Curriculum" (CDCC) in cooperation with the Michigan Department of Education. The series constitutes a response to the ever-increasing need to augment and enhance each students' career development process.

The series of twenty-seven curriculum units consists of a logical, sequenced arrangement of learning activities based on development tasks and content consistent with accepted career development theory and practice.

The approach is one of integrating career awareness with existing subject matter as well as building into the curriculum a sound approach to self-awareness. Learning activities are linked to performance objectives for which there are evaluation techniques; making it possible to assess impact on learners.

Gerald Geik
Project Director

ELEMENTARY CAREER DEVELOPMENT:
THE UNIT APPROACH

An Elementary Career Development Curriculum Unit is a group of interdisciplinary learning experiences for which there are expected outcomes identified in the form of performance objective. Because they are interdisciplinary, they include learning and practice in math, communication arts, science and social studies as vehicles for conveying the career development aspects of an individual's growth. Learning activities are built around either self-awareness or occupational cluster topics.

Developed by teachers or counselors, they are based on CDCC themes and elements, aligned with career developmental tasks.

They include a variety of teaching strategies in the form of role-playing, discussions, work sheets, field trips, use of role models, use of A.V. materials, etc. They include evaluation strategies, (both observational and paper and pencil), based on unit performance objectives. Time of implementation for each unit is approximately two instruction hours per day for a period of two to three weeks. One unit is taught during each nine-week grading period at each grade level.

A single unit is a small part of a total sequence of learning experiences that all together contribute to the individuals career development process.

UNIT TITLES IN THE SERIES
"CAREER DEVELOPMENT CURRICULUM UNITS FOR THE ELEMENTARY CLASSROOM"

	UNIT TITLE	FOCUS
K	ME	Self Awareness: Physical Self
	INSIDE ME	Self Awareness: Emotional Self
	SCHOOL WORKERS	Occupational Clusters: Public Service, Clerical
	COMMUNITY HELPERS	Occupational Clusters: Public Service, Natural Resources, Health
1	FRIENDSHIP	Self Awareness: Social Self
	A FEW OF OUR FAVORITE THINGS	Occupational Clusters: Arts, Technology, Research, Personal & Product Services
	TELEPHONE WORKERS	Occupational Clusters: Transportation, & Communication
	THE FOOD STORE	Occupation Clusters: Business & Sales

	UNIT TITLE	FOCUS
2	MY ENVIRONMENT	Self Awareness: Environmental & Physical Self
	BAKING INDUSTRY	Occupational Clusters: Natural Resources, Manufacturing
	FIREFIGHTERS	Occupational Cluster: Public Service
	PET INDUSTRY	Occupational Clusters: Public Service, Personal & Product Services
3	DAIRY INDUSTRY	Occupational Clusters: Health, Manufacturing
	RESPONDING BEHAVIOR	Self Awareness: Emotional & Social Self
	RESTAURANT INDUSTRY	Occupational Clusters: Health, Hospitality and Recreation
	AIRLINE WORKERS	Occupational Clusters: Health, Hospitality, Recreation Clerical, Technology & Research
4	FORESTRY	Occupational Cluster: Natural Resources
	BEST FOOT FORWARD	Self Awareness: Self Appraisal, Goal Setting and Social Self
	POSTAL WORKERS	Occupational Cluster: Public Service
	POLICE WORKERS	Occupational Clusters: Clerical, Public Service
5	OUR GROUP AND ME	Self Awareness: Group Roles & Social Self
	MANUFACTURING	Occupational Clusters: Clerical, Business, Sales & Trades, Manufacturing
	HOSPITAL WORKERS	Occupational Clusters: Technology & Research, Clerical, Personal & Product Service & Health
	MY FEELINGS ARE ME	Self Awareness: Emotional Self
6	GOING ABROAD, ANYONE?	Occupational Clusters: Transportation & Communication, Hospitality & Recreation
	ME, MYSELF AND I	Self Awareness: Physical, Emotional, Social & Intellectual Self
	T.V. INDUSTRY	Occupational Clusters: Business, Sales & Trades, Arts and Entertainment, Transportation & Communication, Technology and Research

Career Development Centered Curriculum Project
ESEA Title III
Coloma Community Schools
Coloma, Michigan

THE CDCC PROGRAM (K-6)

One dimension of human growth and development is the career development process. In this process each person progresses through a sequence of developmental tasks that make it possible for that person to become a self-fulfilled individual. This is a life-long process involving experiences and decisions that sequentially build on each other. When taken cumulatively, they contribute to the formulation of a realistic self-concept that can be expressed through one's occupational, leisure, family, and civic life-roles.

The career development process can be augmented by building career development curriculum units into the already existing curriculum. In developing the units, three things were considered: 1) career development themes, 2) career development tasks through which individuals normally progress, and 3) subject matter in the already existing curricula. All three of these were brought into focus when generating component goals and objectives and developing learning activities.

The curriculum units altogether constitute the sequential placement of career development activities into the existing K-6 curriculum. Career Development Themes define the *scope* and Career Development Tasks define the *sequence* of the CDCC program. To signify the relationship of the elementary program to the total, elements, themes, developmental tasks and occupational clustering system are presented.

CDCC PROJECT ELEMENTS AND THEMES

CDCC ELEMENT I -- Life-Role Understanding (occupational, avocational, family, civic)

Theme 1.1 The student will understand life-role activity as self-enhancing. (psychological, economic, life-style implications)

Theme 1.2 The student will understand life-role activity as societal-contributing. (economic, societal-need implications)

Theme 1.3 The student will understand the relationship of education to life roles.

Theme 1.4 The student will understand the desirable attributes of individuals in life roles.

Theme 1.5 The student will understand the characteristics of life-roles and their functions.

Theme 1.6 The student will understand the relationship of life-role changeableness to individual cope-ability.

CDCC ELEMENT II -- Decision-Making Skill Development and Utilization

Theme 2.1 The student will set personally relevant goals as part of decision-making.

Theme 2.2 The student will identify and use information about self and life roles as part of decision-making.

Theme 2.3 The student will understand decision-making as identifying alternatives, selecting the alternative most consistent with goals, and taking steps to implement a course of action.

CDCC ELEMENT III -- Realistic Self Concept Formulation

Theme 3.1 The student will understand his or her own uniqueness as a result of personal learning, growth, and maturation.

Theme 3.2 The student will understand the relationship of social and education forces to his or her individual development.

Theme 3.3 The student will understand the relationship of self-knowledge to a value system unique to him or her.

Theme 3.4 The student will understand the relationship of his or her interests, aptitudes and achievements to career goal realization.

CAREER DEVELOPMENT TASKS*
FOR
LIFE-ROLE UNDERSTANDING, C.D.C.C. ELEMENT I

K-3	4-6	7-9	10-12
Occupational values and attitudes are formed and are used as a basis for judgment. Children establish relationships between experience and action, manipulate language and symbols primarily by imitating models and accommodating their behavior to the behavior observed in others with whom they identify, i.e., people in various life-roles. (Focus is generally on home, school and neighborhood.) Children are acquiring respect for particular people and their life-roles, especially for the work they do. (Adults must foster positive attitudes toward all kinds of life-roles.) Children can distinguish between occupations primarily on the basis of tool and uniform clues. They develop interpersonal skills that permit them to gain acceptance by peers in parallel play and sharing.	Children continue to face the same kinds of tasks but with more complexity. They enter the phase of conceptual learning. They develop the ability to conceive the function of life-roles. They generalize (abstract) their respect for specific people and their life-roles to an appreciation of all people everywhere. As they learn the value of mankind, they learn to value themselves. They increase their knowledge of life-roles by expanding experiences beyond home, school and neighborhood. As they begin to understand the concept of work and value it as an institution, they develop self-direction--this helps build a positive self-concept. They are refining interpersonal skills to build confidence in their ability to successfully interact with peers in more complex types of group activities.	Youth develop the capacity to operate on hypothetical propositions--they have learned to think more logically and abstractly. They are better able to cope with cultural and environmental demands. They can make internal interpretations of environmental transactions and generalize these to other situations. Concepts which have been learned previously are used to build further concepts. As they learn about life-roles and life-role settings, they determine the subtle factors involved in life-role satisfaction and rewards--looking for what they personally find necessary, important and valuable. (They should acquire knowledge about life-roles& and curricula to help them think realistically about their futures.)	Youth expand and refine tasks of earlier levels. They determine to a large extent, the course of their own futures. The individual must define the level of his or her educational aspiration and arrange training accordingly. Concepts which the individual holds about self and life-roles become internalized to the point where they form the basis for particular generalizations concerning his or her career life identity. The individual must acquire skills, responsibility, and confidence in life-roles through actual experiences. Through these experiences, individuals test their self concept.

*After Ginzberg (1951), Havighurst (1964), Super (1969), and Tennyson (1970).

CAREER DEVELOPMENTAL TASKS*
FOR
DECISION-MAKING SKILL DEVELOPMENT, C.D.C.C. ELEMENT II

K-3	4-6	7-9	10-12
Fantasy period: Children make unrealistic choices based on dreams and wishes. The individual does not wonder whether he or she has the appropriate abilities to do what he or she wants to do. (Teachers and parents should readily accept unrealistic statements.)	Late fantasy period, early tentative period. (During early tentative period, children should be helped to see that there are still a number of years before career plans must be set.)	Tentative period: The individual begins to recognize the problem of career choice; decisions are tentative but more realistic. The individual is continuously obtaining new information and experience, revising previous choices and making new choices. (Gradually the youngster should be helped to explore the difference between fantasy and reality in making decisions.) The individual begins to formulate a career hypothesis (tentative) --a narrowing process of identifying interests, values, capacities, and opportunities. Making successful decisions strengthens the individual's self-concept.	Late tentative period, realistic period: The individual's considerations become much more practical as well as important. The decision-making process must become personalized. Because the environment is constantly changing, a major real-life problem is how to plan for change--a realistic decision-making process for the individual requiring commitment with tentativeness. As the individual expresses his or her self-concept through complex real-life decisions, he or she becomes able to utilize personal attributes to influence the nature of future choices rather than merely to adapt to external pressures. Learning to make decisions and accept responsibility for them helps the individual develop responsible independence and individuality. The individual's career hypothesis is reformed to make adjustments for changing interests, abilities, values, and increased knowledge of life-roles.

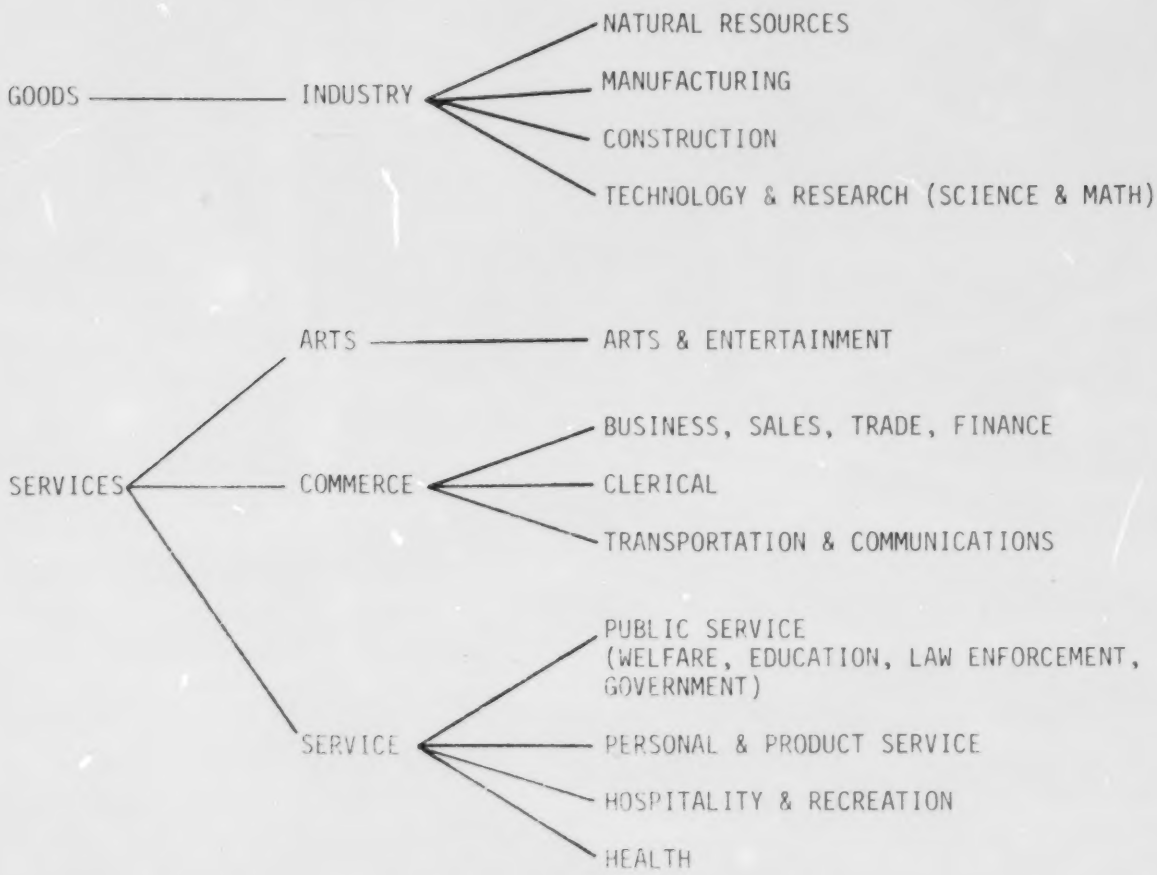
*After Ginzberg (1951), Havighurst (1964), Super (1969), and Tennyson (1970).

CAREER DEVELOPMENT TASKS*
FOR
REALISTIC SELF CONCEPT FORMULATION, C.D.C.C. ELEMENT III

K-3	4-6	7-9	10-12
Children become aware of themselves and their environment and differentiate between them. They are acquiring a sense of some control over their own course of events--a sense of agency. (The child must have successes to build self-confidence thus building tolerance for others). Children begin developing interpersonal skills that permit them to be socially acceptable to their peers. The child realizes that people are not objects and recognizes their humanness. (They need an atmosphere where mistakes are expected and each is respected as an individual.)	The individual is concerned about what he or she can do. The individual should be developing a positive self-concept. Each child develops his or her interest and ability to accomplish tasks. (Children need opportunities to work and reinforcement for it.) Individuals should be building social self confidence in themselves to relate successfully to others. (They need a continued atmosphere of mistakes being expected and tolerated and each is accepted and respected as an individual.)	The individual undergoes great changes physically, intellectually and socially. Each explores his or her self attributes while clarifying the self-concept--each individual reinterprets the self-concept developed earlier in terms of the 'new self'. Each individual must come to accept himself or herself as an entirely different person outwardly, and to some extent inwardly. The single most important task for the individual during this state is to achieve a sense of personal identity.	The individual is engaged in reality testing of the self-concept--each is checking his or her perceptions of abilities, aptitude and other persona resources against external reality. The individual is becoming aware of a preferred life style as related to self-concept.

*After Ginzberg (1951), Havighurst (1964), Super (1969), and Tennyson (1970).

C.D.C.C. OCCUPATIONAL CLUSTERING SYSTEM



USING THE UNIT

SECTION I	Identifies CDCC Elements, Themes, Unit Goals and Performance Objectives to be affected by teaching the unit to a group of learners; includes evaluation design and/or test items for determining impact on learners.
SECTION II	Describes teaching strategies by unit subtopics (capsules) and includes suggested resources for teaching each capsule.
SECTION III	Contains reference information for teachers from which a background can be built to effectively conduct the learning activities.
SECTION IV	Contains activity sheets for student's use.

"Forestry Workers"
Grade 4

Unit Rationale

The purpose of this unit is to help students become aware of the importance of the forest, appreciate its worth, and become acquainted with the role people play in developing, caring for, harvesting, and, in general, enjoying the trees around them.

The themes covered in the unit include the forest workers' "contributions to society," the relationship of academics and education to real life-roles, and the characteristics of the various forest jobs.

The major topics included in this unit focus on the interdisciplinary approach with activities relating closely to science, social studies, math, art, and language arts.

Teacher Information

This unit may be taught in a period of three to four (3-4) weeks. Timing will vary according to the teacher's activities and schedules.

Teacher Preparation

1. Study the unit carefully.
2. Make copies of the necessary evaluation and activity sheets.
3. Refer to the Resources and Materials' Columns. Obtain the necessary materials and/or equipment.
4. Build background information by studying information such as the following:

The World Book Encyclopedia, Field Enterprises Educational Corporation, Chicago, IL.

Myers, J. Walter, Ten Lessons in Forestry, Louisiana Forestry Commission, 1972.

Smith, Norma, Michigan Trees Worth Knowing, Department of Natural Resources, Hillsdale Educational Publishers, Inc., Hillsdale, Michigan, 1970.

Obtain posters and pamphlets from:

American Forest Institute - 1619 Massachusetts Avenue N.W., Washington, D.C. 20036 (202) 667-7807.

Western Wood Products Association - Yeon Building, Portland, Oregon 97204.

Superintendent of Documents, U.S. Printing Office, Washington, D.C. (Has many articles about foresters.)

Ask Any Forester, 5 pp. Society of American Foresters, 1010 Sixteenth Street, N.W., Washington, D.C. 20036. 8¢ (single copies).

In Your Service - The Work of Uncle Sam's Forest Rangers, A.I.B. - 136 U.S. Department of Agriculture, 24 pp. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, 1965. (20¢)

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Grade 4

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ELEMENTS, THEMES, GOALS, AND PERFORMANCE OBJECTIVES
"Forestry Workers"
Grade 4

Element #I - Life-Role Understanding (occupational, avocational, family, civic)

Theme 1.2 - The student will understand life-role activity as societal-contributing. (economic, societal-need implications)

Unit Goal - The student will understand why the foresters' work of protecting our trees contributes to society.

Unit P.O. #1 - Given ten (10) statements concerning the importance of trees, the student will be able to identify with at least 80% accuracy whether each statement is true or false. (Evaluation Sheet #1 - Part A)

Theme 1.3 - The student will understand the relationship of education to life-roles.

Unit Goal - The student will understand the relationship of education to life-roles.

Unit P.O. #2 - Given ten (10) statements concerning the relationship of education to forestry work, the student will be able to identify with at least 80% accuracy whether each statement is true or false. (Evaluation Sheet #1 - Part B)

Unit Goal - The student will become aware of the different methods a forester uses to identify trees.

Unit P.O. #3 - The student will be able to list at least three (3) different characteristics of trees that aid in their identification; i.e., leaves, fruit, bark, etc. (Evaluation Sheet #2 - Part A)

Theme 1.5 - The student will understand the characteristics of life-roles and their functions.

Unit Goal - The student will increase his/her awareness of the characteristics of forestry work.

Unit P.O. #4 - Given ten (10) statements concerning the characteristics of forestry work, the student will be able to identify with at least 80% accuracy whether each statement is true or false. (Evaluation Sheet #2 - Part B)

ELEMENTS, THEMES, GOALS, AND PERFORMANCE OBJECTIVES
"Forestry Workers"
(Continued)

Element #III - Realistic Self Concept Formulation

Theme 3.4 - The student will understand the relationship of his/her interests, aptitudes, and achievements to career goal realization.

Unit Goal - The student will understand how his/her interests relate to forestry work.

Unit P.O. #5 - The student will compare how his/her interests relate to forestry work by completing a self-inventory checklist.
(Evaluation Sheet #3)

Evaluation Procedure
"Forestry Workers"
Grade 4

Pre-Assessment

1. Do not discuss any aspect of this unit with the students before administering the evaluation sheets.

2. Make copies of Evaluation Sheets #1 and #2 for the students.

3. Distribute Evaluation Sheet #1. Read the directions for this sheet aloud as the students read along silently.

4. Read aloud slowly to the students as they attempt to answer each test item.

5. Follow the same procedure for Evaluation Sheet #2. Give it during the same evaluation period.

6. Find the answers for Evaluation Sheets #1 and #2 at the end of this evaluation section.

7. Record the students' raw scores on Evaluation Tabulation Form B in the proper columns. Total the columns at the bottom to indicate the number of students who met the criteria as stated in the objectives.

8. Transfer the totals to the proper columns on Evaluation Tabulation Form A.

9. Study the pre-test results. Determine the areas in which the students need the most practice. Study the unit carefully. Choose activities that will reinforce or teach the skills needed by the students.

Post-Assessment

1. Review the goals and objectives.

2. Review with the students the areas that need more reinforcement.

3. Follow the same procedure as directed on the Pre-Assessment Evaluation Procedure #2-8.

Evaluation Procedure
"Forestry Workers"
Grade 4
(Continued)

4. Give the students Evaluation Sheet #3.

   a. Stress that this is not a test but a self-inventory checksheet. Explain that this checksheet will help them understand how their interests are related to forestry work. (See the answer sheet at the end of this section for further information.)

   b. Use Evaluation Tabulation Form B to check (✓) those students who completed this activity successfully.

   c. Total the number of students who met the criterion as stated in Performance Objective #5. Transfer this total to the proper columns on Evaluation Tabulation Form A.

5. Submit the completed Evaluation Forms A and B to the building office.

Evaluation Tabulation Form A

Unit Name "Forestry Workers" Teacher _____

Building _____ Grade 4th

Performance Objective	*Evaluation Sheet #	Test Items	Accepted Level of Performance	# of Students Taking Test	# of Students Reaching Accepted Level	OPTIONAL % of Students Reaching Accepted Level
1 Pre - Identify the importance of trees.	1 - Sec. A	10	8			
1 Post- Identify the importance of trees.	1 - Sec. A	10	8			
2 Pre - Relationship of education to life-roles.	1 - Sec. B	10	8			
2 Post- Relationship of education to life-roles.	1 - Sec. B	10	8			
3 Pre - Characteristics used in identification.	2 - Sec. A	3	3			
3 Post- Characteristics used in identification.	2 - Sec. A	3	3			
4 Pre - Characteristics of Forestry Work.	2 - Sec. B	10	8			
4 Post- Characteristics of Forestry Work.	2 - Sec. B	10	8			
5 Pre - None						
5 Post- Compare interest.	3	1	1			

*Administer the tests in the sequence listed above.

Date Returned to Principal _____

Evaluation Tabulation Form B

Unit Name "Forestry Workers" Teacher _____

Building _____ Grade 4th

1. Record the students' raw scores for the pre and post Evaluation Sheets #1 and #2 in the correct columns.
2. Figure the percentage of growth for each student at the conclusion of this unit.
3. Use the last column to check (✓) those students who completed the interest sheet (Evaluation Sheet #3).
4. Total the columns at the bottom to show the number of students who met the criteria as stated in the performance objectives.
5. Transfer these totals to Evaluation Tabulation Form A.

Evaluation Sheet #	1-A			1-B			2-A			2-B			3
P.O. # Student Names	#1 Pre	#1 Post	% of Growth	#2 Pre	#2 Post	% of Growth	#3 Pre	#3 Post	% of Growth	#4 Pre	#4 Post	% of Growth	#5 Post
1.													
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													
11.													
12.													
13.													
14.													
15.													

Evaluation Tabulation Form B
(Continued)
"Forestry Workers"

Evaluation Sheet #	1-A			1-B			2-A			2-B			3
P.O. # Student Names	#1 Pre	#1 Post	% of Growth	#2 Pre	#2 Post	% of Growth	#3 Pre	#3 Post	% of Growth	#4 Pre	#4 Post	% of Growth	#5 Post
16.													
17.													
18.													
19.													
20.													
21.													
22.													
23.													
24.													
25.													
26.													
27.													
28.													
29.													
30.													
TOTALS													

Evaluation Sheet #1

Name _____

Date _____

A. Read the following sentences. Underline each true sentence that explains why trees are important.

1. Trees provide protection for wildlife.
2. Trees give off carbon dioxide.
3. Trees help prevent soil erosion.
4. Trees help reduce noise pollution.
5. Trees provide beauty and recreational areas.
6. Trees provide all the food we eat.
7. Trees cool and humidify the air.
8. Trees give off oxygen.
9. Trees and tree by-products are used for making lumber and paper.
10. Trees and their by-products are used for making paints and plastics.

B. Read the following phrases. Underline each true phrase that describes how foresters might use different skills in their work.

1. Use observational skills to identify trees
2. Use math skills to measure height and width of trees
3. Use reading, writing, observational, and communication skills in collecting and writing down information
4. Use map, reading, and writing skills to make and read maps
5. Use math skills to scale logs
6. Use language skills to write poems
7. Use observational skills to identify insects
8. Use observational skills when working with a microscope
9. Use artistic skills to paint pictures
10. Use speaking skills while teaching

Evaluation Sheet #2

Name_____

Date_____

A. List at least three (3) different methods that a forester uses to identify trees.

_____

_____

_____

B. Read the following statements about forestry work. Underline each true statement.

1. A forester may work outside most of the time.
2. A forester always travels by horseback.
3. A forester may work in a lab doing research.
4. A forester must be able to give directions to other workers.
5. A forester needs to have a college education.
6. A forester may manage recreational areas.
7. A forester may measure, select, and mark trees for cutting.
8. A forester must be able to do surveying and mapping.
9. To be a forester you must be a man.
10. A forester aide needs to have a college education.

Evaluation Sheet #3

Name_____

Date_____

We all have certain things we enjoy doing. Did you know that the fun things you now enjoy doing may someday be part of your work.

Read the following statements carefully. After you read each set of statements, place a check (✓) after the one you think best describes you. (Remember this is not a test. This will help you learn more about yourself.)

Do you enjoy the most:

1. a. being outdoors . . . . . _____
   b. being indoors . . . . . _____

2. a. learning about plants and wildlife . . . . . _____
   b. building things with your hands . . . . . _____

3. a. reading to learn something new . . . . . _____
   b. reading for fun . . . . . _____

4. a. working with math figures . . . . . _____
   b. writing stories . . . . . _____

5. a. traveling . . . . . _____
   b. staying close to home . . . . . _____

6. a. making decisions and giving directions . . . . . _____
   b. following directions . . . . . _____

7. a. being alone at times . . . . . _____
   b. always being with others . . . . . _____

8. a. doing hard and sometimes dangerous work . . . . . _____
   b. painting, or playing a musical instrument . . . . . _____

Answers for Evaluation Sheets #1, 2, and 3

Evaluation Sheet #1 - Part A

1.	7.
3.	8.
4.	9.
5.	10.

Evaluation Sheet #1 - Part B

1.	5.
2.	7.
3.	8.
4.	10.

Evaluation Sheet #2 - Part A

Here are some aids used by foresters to identify trees.

leaves	buds	flowers or blossoms
bark	leaf scars and bundles	seeds
silhouette	fruit	location

Evaluation Sheet #2 - Part B

1.	6.
3.	7.
4.	8.
5.	

Evaluation Sheet #3

Stress to the students that this activity is to help them become aware of their interests. Have them complete Evaluation Sheet #3, and stress to the students that if they have checked (✓) five (5) or more a answers, the activities that they enjoy are similar to the work of the foresters. Encourage the students to find out more about foresters.

Discuss Evaluation Sheet #3 with the students. Be careful not to insinuate that certain answers are better than others.

Capsule #1
Introduction

I. Introduce this unit by doing one of the following activities:

A. Give the students a copy of the poem, "I Planted A Tree," on Activity Sheet #1.

1. Read the poem aloud to the students.

2. Ask them to discuss what the poem means to them.

3. Let the students illustrate the poem in the space provided on Activity Sheet #1.

B. Show the film, To Touch The Sky.

1. Discuss the following questions with the students.

a. Ask what a forest means to them.

b. Ask if trees are important and why.

c. Ask how forestry workers make the forest more useful.

d. Ask what are some of the jobs performed by workers in the forest.

C. Show slides of trees, or have a guest come and show them.

II. Help the students become more aware of the importance of the forest by choosing from the following activities.

A. Give the students Activity Sheets #2-5.

1. Read the sheets, and let the students discuss what each of the areas mean to them.

2. Discuss the products and the by-products of the forest. Let the students search to identify others.

a. List these products on the board.

b. Let the students make a bulletin board to illustrate the products from the forest. (Reference Sheet #1)

c. Have the students make a display of forest products and by-products.

Resources & Materials	Notes
I. A. Activity Sheet #1 (one for each student) B. Films To Touch The Sky 30 min. Modern Talking Picture Service 2323 Hyde Park Rd. New Hyde Park, NY 11040 Rainbow Valley The Work & Responsibilities of a Forest Ranger 28 min. John Hall Film Service 1923 W. Atkinson Ave. Milwaukee, WI 53206 Filmstrips Trees and Wildlife American Forest Institute 1619 Massachusettes Ave., N.W. Washington, D.C. 20036 Wood and The Home Environment American Forest Institute II. Activity Sheets #2-5 b. Reference Sheet #1 Construction paper	

B. Have the students make a mural to illustrate why trees are important.

III. Stress the need for forestry workers by discussing the following with the students:

A. Ask why America needs people to protect its forests.

B. Ask if the students can name some enemies of the forest. (Insects, disease, people, fire, animals, etc.)

C. Ask how people can help protect the forests. (Be careful with fires, do not be wasteful of forest products, support the work of the foresters, etc.)

D. Ask if this country is running out of trees. (Yes and No - Americans keep producing more trees, but their need for forest products keeps increasing, and they keep destroying more trees to make way for building projects.)

E. Explain to the students that they will be studying about the forest, its enemies, and the workers who protect and manage it.

IV. Choose from these optional related activities.

A. Stress reading and language skills.

1. Have the students start booklets about Forestry and Forestry Workers.

2. Review how people benefit from trees. Have the students do the word-exercises on Activity Sheets #6 and #7. (Reference Sheet #2)

B. Stress art skills.

1. Have the students decorate the room with pictures of trees and leaves.

2. Let them do a blow art activity.

a. Give the students sheets of paper and straws.

b. Drop a large drop of black ink or tempra on the papers.

c. Let the students blow the ink through the straw until it has spread across the paper to resemble tree branches.

Resources & Materials	Notes
IV.	
A. Activity Sheets #6 and #7 Reference Sheet #2	
B. Black ink or tempra paint Drinking straw Colored or white construction paper	

d. Let them add leaves by dabbing paint on the ends of the branches with sponges or by making small wads of tissue paper to glue onto the branches.

e. Use these pictures to make booklet covers or to decorate the room.

Resources & Materials	Notes

Capsule #2
Silviculture

I. Pass out five (5) different types of leaves still attached to small sections of branches.

A. Ask the students to examine the leaves very carefully and to tell what they notice. (Don't give them any hints.) Use copies of Activity Sheet #8 if leaves are not available. (See Reference Sheet #2 and #3 for more information)

B. List the students' observations on the board. (The color of the leaf and the bark; the type of surface - smooth, rough, shiny, dull; the type of buds and scars, the placement of the leaves on the stem; the type of leaf edge - serrated or smooth; the shape of the leaf, etc.)

C. Discuss the following questions with the students:

1. Ask how observing the characteristics of leaves and trees helps people. (Explain that it helps them to identify the different trees.)

2. Ask why foresters need to identify different trees. (Explain that they need to identify what trees need to be replaced, what trees need to be planted in a particular type of soil, what trees need to be harvested, etc.)

II. Write the word silviculture on the board. Ask the students if they know the meaning of this word. (Say it is the growing of trees.) Write silviculturist on the board. Underline ist. Ask the students if they can tell what this word means. (Say it is one who cares for trees.)

III. Give the students Activity Sheet #9.

A. Ask them to identify the different skills or knowledge that a forester (or silviculturist) must have to grow trees successfully.

1. Say foresters have the ability to recognize the tree's needs of water, carbon dioxide, food, and soil to survive.

2. Explain that they have the ability to identify different types of trees by observing their leaves, bark, and silhouettes.

3. Say that they have the ability to determine which types of soil are best suited for the different types of trees.

Resources & Materials	Notes
I. Twigs with leaves attached. A. Activity Sheet #8 Reference Sheets #2 and #3 III. Activity Sheet #9	

4. Explain that they have the ability to make accurate observations and tests to determine what is needed by the different trees. (More or less sun, more or less water, nutrients, different types of soil, etc.)

B. Let the students write their responses on the bottoms of their worksheets.

C. Discuss other characteristics of a foresters' work. (Outdoor activities, hard work, seeing things grow, working with other people, keeping data by making observations and recordings, working with the soil, etc.)

IV. Choose from these optional related activities.

A. Stress science skills.

1. Help the students to identify leaves by providing them with tree identification books and by allowing them to work alone or in groups to make one leaf collection for the entire room.

a. Let the students go as a group to gather leaves, or let them bring the leaves from home. (Remind them to take a large magazine or catalog in which to press the leaves. Have them make notes about the color of the bark, shape of the tree, silhouette, etc.)

b. Let the students mount and label the pressed leaves during the science period.

c. Have them arrange these mounted leaves on a bulletin board according to types (oaks, maples, willows, leaf or leaflet, evergreen or deciduous, etc.)

d. Have the students study books and filmstrips on tree identification.

2. Let the students study the bark of trees by scratching, feeling, and observing its color, texture, and weight.

3. Have the students study about the different parts of trees on Activity Sheet #10. (See Reference Sheet #2)

4. Let the students collect different types of tree seeds to study, classify, and observe.

Resources & Materials	Notes
d. Books on tree identification. Telling Trees Apart SVE 3. Activity Sheet #10 Reference Sheet #2 4. Magnifying glass	

5. Have the students plant the tree seeds.

   a. Let them experiment by planting the seeds in different types of soil.

   b. Let them experiment by increasing or decreasing the amount of water for the seeds.

   c. Let them experiment by increasing or decreasing the seed's exposure time to the sun.

   d. Have the students collect data by making daily observations and recording this information on Activity Sheet #11a. (See Reference Sheet #4) Explain to the students that accurate observational and recording skills are very important to the forestry workers.

6. Let the students plant the seedlings which they obtained free of charge from their local conservation office. Discuss the proper technique for planting trees. (See Reference Sheet #5)

7. Have the students experiment by trying to root trees from branches. (Note that willow branches root rapidly, but the students should discover this fact by experimenting with different types of branches and not by being told.) See the data collecting sheet, Activity Sheet #11b, and Reference Sheet #4.

B. Stress art skills.

1. Have the students make crayon rubbings of leaves and/or bark.

   a. Let them identify and label the rubbings.

   b. Have them decorate the room with rubbings or put the rubbings into booklets about the Forestry and Forestry Workers.

2. Have the students make wax paper transparent pictures.

   a. Let them place a leaf on a sheet of 8" x 10" wax paper.

   b. Have them sprinkle a few crayon shavings, colored tissue, or colored celophane paper around the leaf.

   c. Let them place another sheet of wax paper over the top of the leaf.

Resources & Materials	Notes
5. Tree Seeds	
d. Activity Sheet #11a Reference Sheet #4	
6. Reference Sheet #6	
7. Activity Sheet #11b Reference Sheet #4 Willow branches and others.	
2. Wax paper Old crayons Sharp knife Newspaper Iron	

d. Have them place a newspaper on top of the wax paper.

e. Let them press it with a warm iron.

f. Have them frame these colorful transparent pictures and hang them in the windows.

3. Let the students make silhouettes of the leaves.

a. Have them place a leaf on a sheet of blueprint paper.

b. Let them put a glass on the leaf to hold it down.

c. Have them lay the speciman, paper, and glass in strong sunshine for about a minute.

d. Let them take it inside and apply a fixative of potassium bichromate. (Obtain it from dealers in large supplies.)

e. Let them display the blue prints for a science exhibit.

C. Stress language skills.

1. Let the students practice the proper word usage of "saw", "seen", "was", and "were", on Activity Sheet #12.

2. Let the students practice the proper word order in a sentence on Activity Sheet #13.

Resources & Materials	Notes
3. Blueprint paper Sheet of glass 8" x 10" Leaves Potassium bichromate	
1. Activity Sheet #12 Reference Sheet #2 2. Activity Sheet #13 Reference Sheet #2	

Capsule #3
Insects and Disease

I. Allow the students to examine pieces of tree branches or wood that has been damaged by insects and disease.

   A. Discuss what damaged the wood.

   B. Ask what gives a clue that the damage was done by insects. (Burrow holes in the wood)

   C. Ask if insects and diseases are enemies of the forest. (Explain that insects and disease rank as the chief enemies of forests.)

   D. Ask why a knowledge of insects and tree diseases is of value to a forester. (Say that foresters help prevent and control damage caused by these two enemies.)

II. Write the word ENTOMOLOGY on the board.

   A. Ask students if they know what this word means. (Say that is the study of insects.)

   B. Ask students if they know what a person who studies entomology might be called. (Entomologist)

   C. Write entomologist on the board underlining ist. Explain to the students that some foresters may specialize in entomology. Explain that these foresters will probably work mainly in the area of identifying insects.

   D. Ask the students to find a word that might describe a person who specializes in the study of plant and tree diseases. (Plant pathologist)

III. Stress the foresters' work by giving the students Activity Sheet #14 and by discussing the skills and training needed by a forester as he/she works to identify and to control insects and disease. (Say that he/she needs observational skills, a knowledge of insects and their habits, and a knowledge of plant diseases and their causes.)

IV. Take the students on a field investigation or an excursion around the schoolyard. Have them search for damage caused by insects or disease.

V. Choose from these optional related activities.

Resources & Materials	Notes
I. Tree branches with tree disease and/or insect damage. III. Activity Sheet #14	

A. Stress language and science skills.

1. Let the students make a report on damage caused by insects and disease. Have the students study tree growth by observing the rings.

2. Give the students Activity Sheets #15a and #15b. Let them study the diagram and read the paragraph on Activity Sheet #15a before they answer the questions on Activity Sheet #15b. (Answers on Reference Sheet #2b)

B. Stress science skills.

1. Have the students collect specimens and make a display of such items as the following:

   a. Let them display insect and disease-damaged branches and twigs.

   b. Let them show insects that damage trees.

   c. Let them include fungi that damage trees.

2. Have them use a microscope or a magnifying glass to examine spores from plants that damage trees.

C. Stress art skills.

1. Let the students draw pictures of insects that damage trees.

2. Display these pictures, or add them to the students' booklets.

Resources & Materials	Notes
2. Activity Sheets #15a and #15b (one for each student) B.	
2. Microscope Magnifying glass Spores from plants that damage trees. C. 1. Drawing paper	

Capsule #4
Fire

I. Ask the students to name another enemy of the forest that is very fast, fearsome, and fatal. (Fire)

II. Show a film or a filmstrip, read a story, or talk with a forester.

A. Discuss what causes the greatest number of forest fires. Mention the three (3) main causes of forest fire - men, women, and children. Explain that ninty-eight percent (98%) of the fires are started by the carelessness of people.

B. Ask how people start forest fires. (Discarded cigarettes, campfires improperly extinguished, trash fires out of control, sparks from vehicles and train locomotives, etc.)

C. Ask what is another cause of forest fires. (Lightning)

D. Discuss who takes the responsibility for controlling forest fires. (The forester)

E. Give the students Activity Sheet #16, and discuss forest fires and the role of the forester.

F. Ask how extensive is the damage caused by forest fires. (Explain that besides destroying millions of acres of trees each year, forest fires kill seeds and seedlings necessary for new life; kill litter vital to the formation of humus; sometimes destroy existing species and change conditions to make it easier for other species to enter the scene; inflict "wounds" which weaken trees so they become prey to insects and disease; and destroy wildlife living in the forests, their homes, and food supplies.

III. Choose from these optional related activities.

A. Stress science and safety skills.

1. Take the students outside to demonstrate good campfire rules and procedures.

a. Stress that matches must be put out and broken in two before they are thrown away.

b. Explain that pipe ashes and cigar or cigarette stubs must be dead before they are thrown away. Tell the students never to throw them into brush, leaves, or needles.

c. Make a campfire by scraping away all the flammable material from a spot ten (10) feet in diameter. Dig a hole in the center in which to build the fire. Keep the fire small. Never build it against trees or logs or near brush.

Resoruces & Materials	Notes
II. Filmstrip: Smokey Bear and Little Marcy SVE	
E. Activity Sheet #16 (one for each student)	
A. Matches	
c. Twigs Log Sand Shovel	

d. Put out a campfire by stirring the coals while soaking them with water. Turn the charred sticks, and drench both sides. Wet the ground around the fire. Be sure the last spark is dead.

e. Break camp only after the fire is dead and cold.

2. Demonstrate how a fire is produced and what a fire is by doing the following activities:

a. Place a candle in front of the class.

1) Ask the students to observe the candle and to tell what is necessary in order for a fire to exist. (Let them say fuel, correct kindling point, and oxygen.)

2) Ask them to identify the element that is missing as they observe the candle. (The correct kindling point)

3) Ask the students what can produce the correct kindling point. (Say it is heat from a match. Explain that the match will reach its kindling point when it is rubbed because friction produces heat.)

4) Ask one of the students to rub the unlit candle in the same manner the match was rubbed. Ask why the candle didn't burn. (Explain that different substances must be heated to different kindling points in order to burn.)

5) Light the candle, and then place a large glass jar over it. Ask the students to identify the element that is now missing in order for a fire to burn.

6) Ask the students to identify the fuel. (The candle)

b. Light the candle again. Have the students observe the fire.

1) Ask them what is fire. (Heat and light)

2) Ask what this process is called. (Burning or combustion)

B. Stress art skills.

1. Let the students draw posters about forest fire prevention. Display these posters around the school. (Have a poster contest)

2. Let the students make a diorama to show forest firefighters at work.

Resources & Materials	Notes
2. Candle Match Large glass jar	
1. Paper for posters Paint	

C. Stress language and social studies.

1. Have the students report to the class on, "The Causes of Forest Fires".

2. Have the students report to the class on "The Effects of Forest Fires".

3. Have the students report to the class on "How to Prevent Forest Fires".

Resources & Materials	Notes

Capsule #5
Surveying

I. Give the students Activity Sheet #17.

A. Ask if they think a map like this would be of any value to a forester and how it would help him/her. (Say that it tells him/her where forests are located and helps him/her locate bridges, rivers, and other information needed in transporting equipment and lumber.)

B. Ask what the different symbols on the map represent.

II. Give the students Activity Sheet #18. Discuss the role of a forester in relation to surveying.

III. Choose from these optional related activities.

A. Stress social studies skills.

1. Give the students Activity Sheets #19a, 19b, and 19c.

a. Let the students complete the activities on the sheets.

b. Let them color the maps.

2. Let the students make maps of the school grounds and indicate the different types of trees, if possible.

3. Have the students make maps of the areas around their homes.

B. Stress language skills.

1. Have some students (individually or in groups) give reports on the different forests of the United States.

2. Let the students view filmstrips and discuss the different forests.

Resources & Materials	Notes
I. Activity Sheet #17	
II. Activity Sheet #18	
III.	
1. Activity Sheets #19a, 19b and 19c Construction paper	

Capsule #6
Managing the Forest

I. Let the students view a film, read a book, or study articles on forest management.

   A. Ask if they can identify other enemies of the forest besides man, fire, insects, and disease. (Wind, animals, and weather)

   B. Discuss other jobs foresters do besides surveying; growing trees; and controlling fires, insects, and disease. (Say that they decide what trees need to be harvested, estimate the amount of lumber that may be contained within an area, advise tree farmers on how to care for their trees, help tourists and campers enjoy and care for forests and campgrounds, and teach college or adult education classes.

   C. Ask if people have to go to school to become a forester. (Yes, they must go to four or more years of college.)

   D. Ask if there are jobs in the forest that a worker may do without going to college. (Explain that a forester aide may be trained by a forester to do one of the many different jobs a forester may be trained to do; i.e., scale logs, act as a park ranger, drive trucks, fight forest fires, etc.)

II. Introduce the students to forest management by having them visit a forest or a wood lot with a forester. (See Reference Sheet #6a and #6b)

III. Review the work of the forester.

   A. Give the students Activity Sheet #20. Discuss the roles of foresters in managing the forest.

   B. Ask them to name the different jobs that might be performed by foresters and their aides, and list these jobs on the board.

IV. Review the enemies of the forests. Give the students Activity Sheet #21, and ask them to identify these enemies of the forest.

V. Choose from these optional related activities.

   A. Stress math skills.

Resources & Materials	Notes
II. Reference Sheets #6a and #6b III. A. Activity Sheet #20 (one for each student) IV. Activity Sheet #21 (one for each student)	

1. Help the students to understand the relationship of math skills to foresters. Let them work individually or as a group.

2. Have them find the D.B.H. of a tree. (See Reference Sheets #7a, 7b, and 7c)

3. Have them find the merchantable height of a tree. (See Reference Sheet #8a)

4. Have them estimate the amount of timber in a small group of standing trees. Explain that this is known as timber estimating, or timber cruising. (See Reference Sheets #8a, 8b, and 8c)

5. Explain log scaling.

   a. Let the students build a scaling stick. (See Reference Sheet #9a and #9b)

   b. Have them estimate the number of board feet in a log. (See log scaling - Reference Sheets #9a and #9b)

   c. Let the students use the table on these reference sheets to work the problems on Activity Sheet #24.

6. Have the students record log scaling and timber cruising on Activity Sheet #25.

B. Stress social studies skills.

1. Have the students discuss other areas of forestry work on Activity Sheet #23.

2. Let the students survey the school grounds and report what could be done to give better care to the school's trees; i.e., mark trees that show disease or insect damage, check to see if they need to be removed, decide if the trees could grow better if they were thinned, etc.

3. Let the students study the grounds carefully and make recommendations to the principal or the parents' club for improvement.

C. Stress language skills.

1. Have the students write a play about forestry.

2. Let them present their play to their parents as a culminating activity.

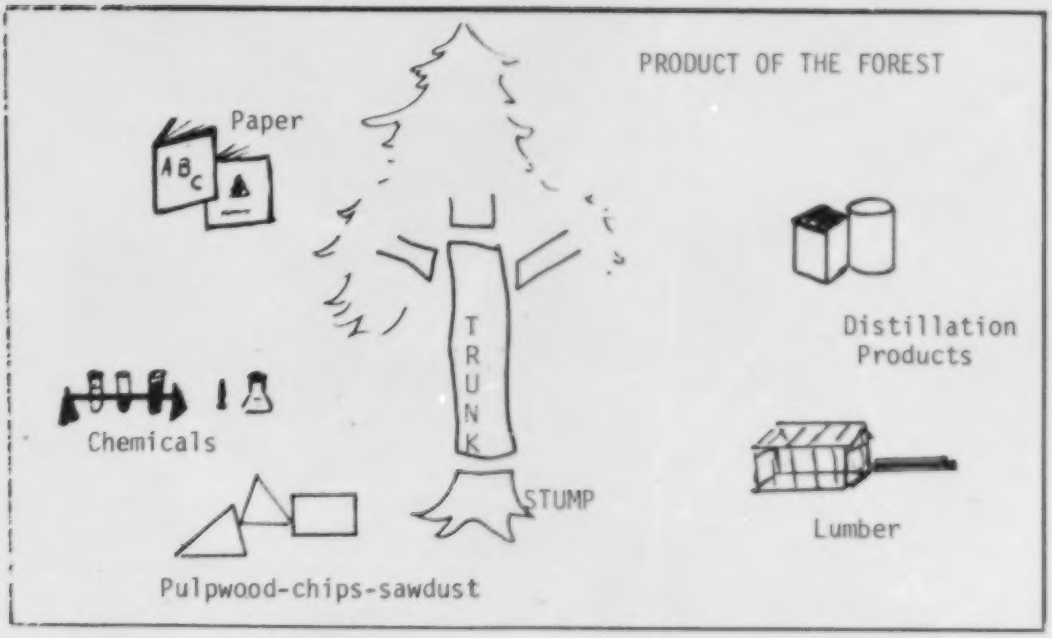
D. Stress art skills.

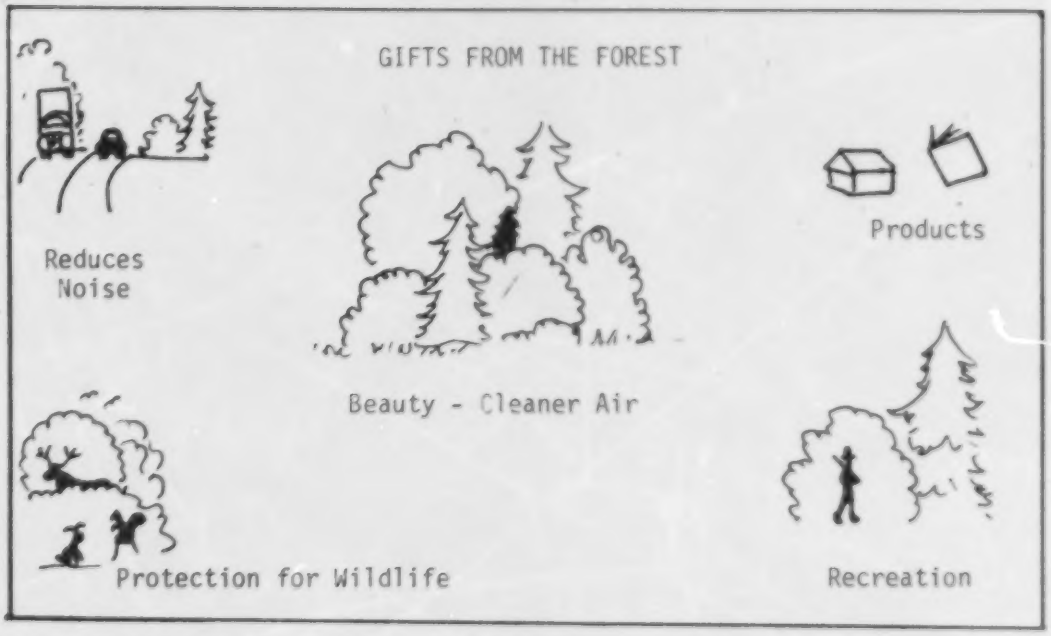
1. Let the students make a mural to go with their forestry program.

2. Let the students make background figures or other props to go with with their play.

Resources & Materials	Notes
2. Reference Sheets #7a, 7b, and 7c 3. Reference Sheet #8 4. Reference Sheet #8a, 8b, and 8c a. Reference Sheets #9a and #9b 6. Activity Sheet #25 (one for each student) 1. Activity Sheet #23 (one for each student)	

Reference Sheet #1



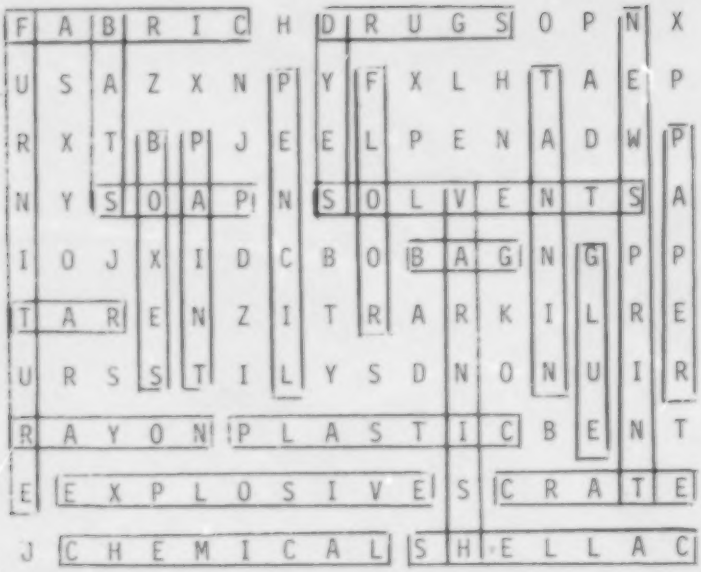


Reference Sheet #2
Answers to Activity Sheets

Activity Sheet #6

1. Future
2. Oxygen
3. Recreation
4. Erosion
5. Noise
6. Protection
7. Products

Activity Sheet #7



Activity Sheet #8

A. White Pine
B. Trembling or Quaking Aspen
C. White Oak
D. Black Maple

Activity Sheet #10

1. Trunk
2. Roots
3. Leaves
4. Bark

Activity Sheet #12

1. was	1. saw
2. was	2. saw
3. were	3. seen
4. was	4. see
5. was	5. seen
6. were	6. see

Activity Sheet #13

1. The state tree of Michigan is the white pine, or
   The white pine is the state tree of Michigan.
2. Nearly all trees have seeds that fall to the earth.
3. Reforesting means replanting trees on land that was once covered by forest.
4. Tree seeds are first planted in a tree nursery.
5. When tree seedlings reach the right height, they are replanted.
6. A forester inspects a tree farmer's trees.

Reference Sheet #2
(Continued)
Answers to Activity Sheets

Activity Sheet #15b

1. G
2. F
3. E
4. B
5. D
6. C
7. A

Activity Sheet #17b

1. 3
2. Clear Lake Forest
3. Bryan State Park
4. #3
5. No
6. Conifer
7. 2
8. West or northwest
9. West Pine
10. #3

Activity Sheet #19b

1. Pacific Coast
2. Southern
3. Tropical
4. Central Hardwood
5. Northern
6. Rocky Mountain and Pacific Coast
7. Gulf of Mexico
8. Gulf of Mexico
9. Northern
10. Northern, Pacific Coast, and Rocky Mountain

Activity Sheet #21

1. man
2. insects
3. wind (or weather)
4. fire
5. animals (or squirrel)
6. disease

Activity Sheet #22

1. seed
2. pine
3. forester
4. park
5. insects
6. logger
7. wood
8. silviculture
9. lumber
10. seedling

Activity Sheet #24

1. 10
2. 85
3. 35
4. 160
5. 210
6. 255

Reference Sheet #3

ovate obvate elliptic lance shaped linear deltoid heart shape

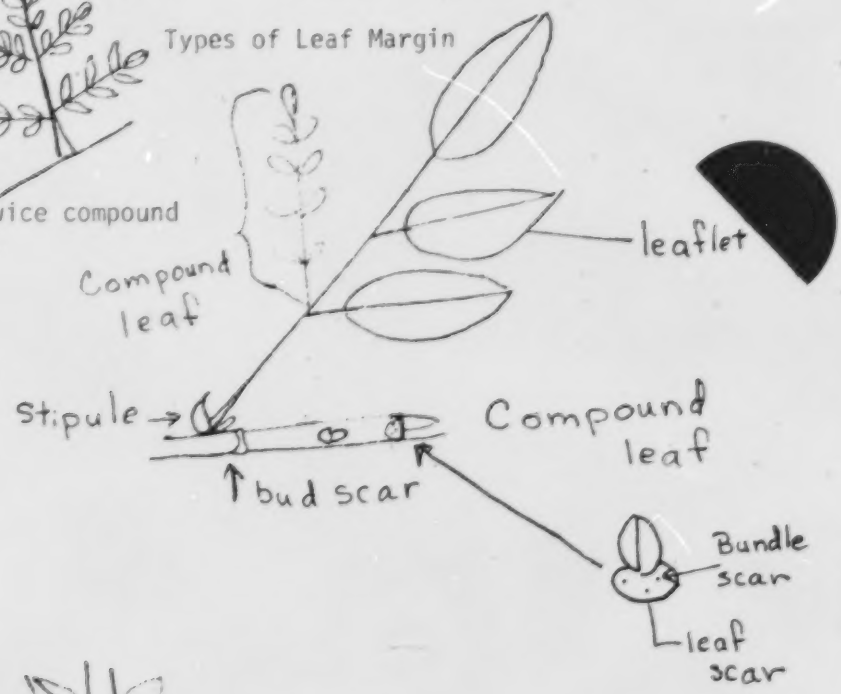
Shapes of Leaves

smooth wavy (undulated) finely serrate coarsely serrate doubly toothed bluntly toothed lobed

Types of Leaf Margin

single fan compound twice compound

Types of Leaves



opposite alternate whorled

Placement of Leaves on Branch

57

Reference Sheet #4

Collecting Data

Divide the students into groups, or let them work alone. Use Activity Sheet #11 as only a suggestion for a data collection form.

Let the students try a few experiments.

1. Have the students plant seeds in different types of soil. Let them record the different soil types in the blanks. Have them make and record predictions as to what they think will happen during the experiment. Let them check and record growth at specific intervals. Have them record daily observations. Have the students draw and record their own conclusions as to what has happened at the completion of this experiment.

2. Let the students try to root tree branches by placing them in water for several days.

3. Have the students experiment to find which types of seeds sprout and grow the quickest.

4. Let the students wrap a plastic bag around a growing plant to observe its transpiration.

USING THE PLANTING BAR

Plunge bar at above angle. Then push forward to upright position.

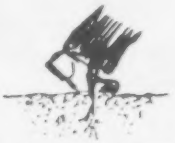
Place seedling against flat side of planting hole.

Plunge bar into ground 3 inches from seedling.

Pull handle of bar toward planter, firming soil at bottom of roots.

Next push handle of bar forward to pack soil at top of roots.

Last hole can be filled by tramping in loose soil with heel.



Stamp loose earth around seedling with feet to prevent air pockets.

CHOOSING THE SPACING:

Red Pine, White Pine, Austrian Pine

Open land to 1/4 shade - plant approximately 600 trees per acre with seven (7) foot spacing in rows ten (10) feet apart.

1/4 to 3/4 shade - plant 300 to 500 trees per acre spaced not closer than seven (7) feet in ten (10) foot rows or patches.

Jack Pine

Open land to 1/4 shade - plant approximately 900 trees per acre with six (6) foot spacing in rows eight (8) feet apart.

1/4 to 3/4 shade - plant 300 to 800 trees per acre spaced not closer than six (6) feet in eight (8) foot rows or patches.

Spruce, White Cedar

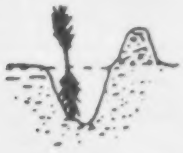
Open land to 1/4 shade - plant approximately 700 trees per acre with six (6) foot spacing in rows ten (10) feet apart.

1/4 to 3/4 shade - plant 300 to 600 trees per acre spaced not closer than six (6) feet in ten (10) foot rows or patches.

CHOOSING THE GROUND PREPARATION

The use of an approved chemical for control of competing vegetation will eliminate the need for furrowing or scalping and has distinct advantages over mechanical ground treatment. Technical guides are available from DNR Foresters or Extension Service and USDA officers.

PLACING SEEDLINGS AT PROPER DEPTH



Correct: Place seedling in hole at same depth or ½ inch deeper than it grew in nursery.

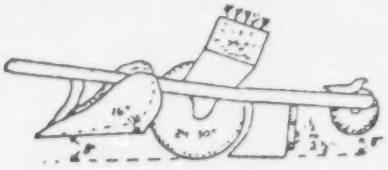
Incorrect: Note how root is curled up. This prevents proper growth. Tree will die.

Incorrect: Roots are exposed to air—a slight tug will indicate shallow planting.

MACHINE PLANTING

The planting equipment should be such that it opens a slit and permits verticle placement of at least an eight-inch root system below the level of the furrow bottom. The soil should flow back uniformly leaving no air spaces

The packing wheel should firm the soil around the roots and leave the top in an upright position. Long roots should be cut back to a length suited to the stock and equipment being used. Either poor root placement or excessive root pruning will greatly reduce the growth of the trees.



Planting shoe should run enough below scalping attachment and packing wheels to accommodate the root system of trees being planted. In no case should this be less than 8" for general field use.

Trees must be at least 4". Prune roots to about 8".

HAND PLANTING

Planting blades of hand planting tools should be at least four inches wide and ten inches long

PLANTING BY MATTOCK OR SHOVEL METHOD

Plunge Mattock in center of furrow or scalp. Lift handle and pull.

The seedling is placed along straight edge of hole at correct depth

Prevent air pocket by packing soil around bottom of roots.

Pack freshly turned soil down with firm stamp of heel.

Level off soil around stem of seedling with sole of shoe.

Reference Sheet #6a

Role-Model

Contact the role-models at least two weeks prior to their visit. Explain what the students expect of them, and give them an idea of what questions the students will be asking. (See below) Be sure to have them bring as many tools as possible and wear their uniforms, if they have any. Follow this contact up with a letter to confirm the date, time, etc. Have the role-models plan to talk about twenty to twenty-five (20-25) minutes and then answer the students' questions. Be certain to tell the role-models that the students want to handle the tools and to try on parts of their uniforms, if possible.

Suggest the following questions to the role-models:

1. Ask, "What is your job?"
2. Say, "Do you like your job?"
3. Ask, "How many hours do you work a day?"
4. Say, "What kind of training have you had?"
5. Ask, "Does anyone check on what you do?"
6. Ask, "What do you like most about your job?"
7. Ask, "What do you like least?"
8. Say, "What tools do you use?"
9. Suggest questions about the model's personal life. (family, hobbies, etc.)
10. Ask, "What are desirable worker characteristics?"

Add more questions to this list for each occupation. Develop the questions with the class prior to the role-models' visit. Let the students write the questions down so that they have something to start with.

Tape-record the role-models' visit for playing at a later time. Take pictures to use when reviewing.

Follow-up their visit by a class discussion.

Send thank-you letters or have the students send them within a day or two after the role-models' visit.

Reference Sheet #6b

Field Investigation

Call the place the class is planning to visit at least one month in advance. Follow-up this call with a letter confirming all the things discussed and planned.

Discuss with the individual the following things:

1. Tell what you wish to see.
2. Mention what general questions the students will be asking.
3. Say how long they will be there.
4. Tell how many students will come.
5. Ask to which workers the students may talk.
6. Ask what equipment or tools the students may use or see.
7. Find out what kind of "hands on" experiences the students may have.

Obtain the principal's approval before planning the field investigation. Make bus arrangements for the students at least two weeks in advance.

Have two or three parents accompany the students on their trip. Contact them at least two weeks in advance.

Send a letter home to the parents telling where the students are going, when they are going, and if they need anything extra in the way of food, clothing, or money.

Prepare the students before the trip with the questions to ask the workers they will be seeing. Note that each investigation will be different. Suggest to the students that they bring a camera along.

Be sure to remind the building principal on the day of the trip about where the students are going and when they will return. Do the following activities when the students return from their trip:

1. Review what the students observed.
2. Review the interviews with the workers.

Be sure to send a thank-you letter or to have the students write and send one.

Reference Sheet #7a

How to Construct and use Calipers

D.B.H. - Diameter breast high. The diameter of a tree at a point 4½ feet above the average ground level.

How to Construct the Caliper

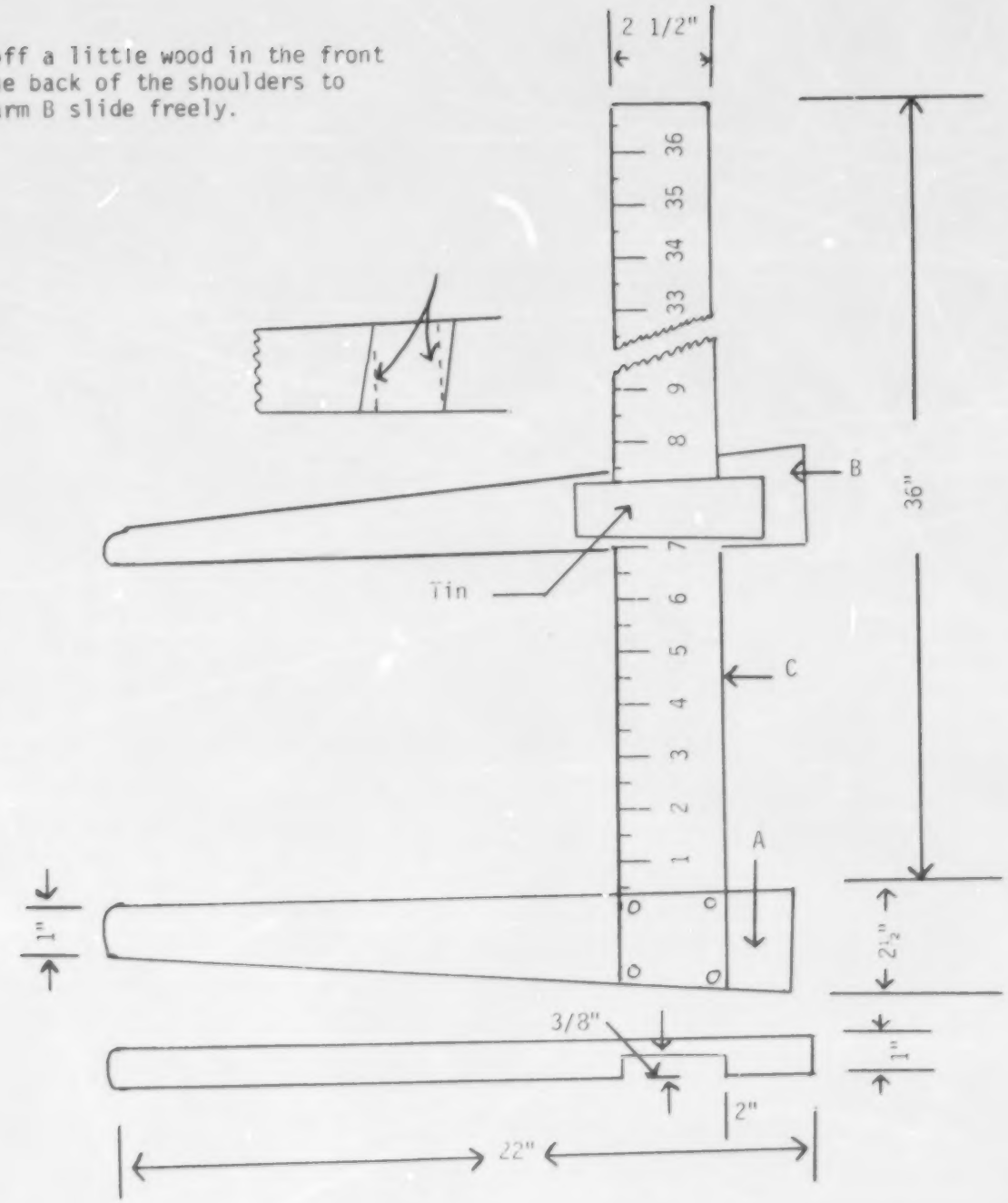
Make calipers from pieces of waste lumber. Cut and plane the pieces making up the calipers to the size shown in the Figure. Note that the 36 inch piece on which the scale is to be numbered should be carefully planed to a uniform width and thickness so that it will readily slide through the mortise cut in arm B. Be sure the mortise in arm B is cut slightly deeper than three-eights of an inch and that a little wood is trimmed off the shoulders so that arm B will slide freely along scale C. Be careful in building the calipers so that the arms A and B are parallel when the calipers are used to measure trees, otherwise the measurements obtained will not be correct. Put on the numbering scale with a hard-lead pencil. Place figures on both sides of the scale so that the calipers can be used either right or left-handed. Use one or two coats of clean water-proff varnish to protect the figures and preserve the instrument.

How to Use the Calipers

Measure the D.B.H. of a tree by holding the calipers with both hands so that the trunk of the tree is between the two caliper arms. Be sure that the tree is measured at a point 4½ feet above the ground, otherwise the D.B.H. will not be obtained. Measure the diameter the small and large way, and average the two to obtain the D.B.H. if the tree is not round.

Information on the construction and use of tree calipers and a hypsometer is taken from U.S.D.A. Farmers' Bulletin No. 1210, Measuring and Marketing Farm Timber and Michigan State University Cooperative Extension Service 4-H Youth Programs Bulletin No. 32.1-C Forest Management.

Trim off a little wood in the front and the back of the shoulders to make arm B slide freely.



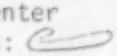
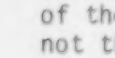
Reference Sheet #8a

How to Make and Use a Hypsometer

Merchantable height - the length of the tree stem or trunk from the top of the stump to a point on the trunk beyond which saleable logs or other products cannot be cut. For sawlogs the merchantable height is usually to a top diameter of not less than eight inches, because most sawmills prefer not to buy logs with a smaller top diameter. For cord products the merchantable top is generally considered to be not less than four inches in diameter. The merchantable top may occur at a lower point on the trunk than mentioned above if merchantability should be limited by forking, large branching, or deformity. In estimating timber it is not practical to climb a tree and measure where the merchantable top occurs. Where this point occurs must be judged by eye.

How to Make a Hypsometer

Figure 1 shows how to make a hypsometer. Take a piece of half-inch board 7 x 9 inches and plane it smooth on all sides. Draw the line AB three-eights of an inch from the lower edge and parallel to it. Two inches from the left end of the wood draw CD at right angles to AB. Make a mark at E, six and one-fourth inches from D, and another at F, three and one-eighth inches from D. Now draw line JK through F, parallel to AB. Start at D, lay off inches and quarter inches on AB in both directions, marking D as zero and putting down the number of inches from D to each inch mark. Do the same for the line JK. Take a brad or small nail and drive it in carefully on the line JK just an inch from the edge of the board. Drive it in until the point comes out the back of the board; then pull it out and drive it in from the back until the point sticks out about one-fourth inch from the face of the board. File off or cut off with pliers any part of the brad that projects from the back of the board. In the same way insert another brad near the other end of the line JK. These brads are the sights and it is important that they be straight and true.

Now take a piece of straight, heavy wire ten inches long, and bend one end of it into a loop about an eighth of an inch in diameter. The center of the loop should be in line with the straight part of the wire thus:  not thus  . Fasten this piece of wire loosely to the board at E with a half-inch screw, so that it will swing freely when the board is on edge. The loop should be big enough to fit loosely over the shank of the screw, but small enough so that it will not slip over the head.

Screw a piece of wood about six inches long, one inch wide, and half an inch thick to the back of the board to serve as a handle.

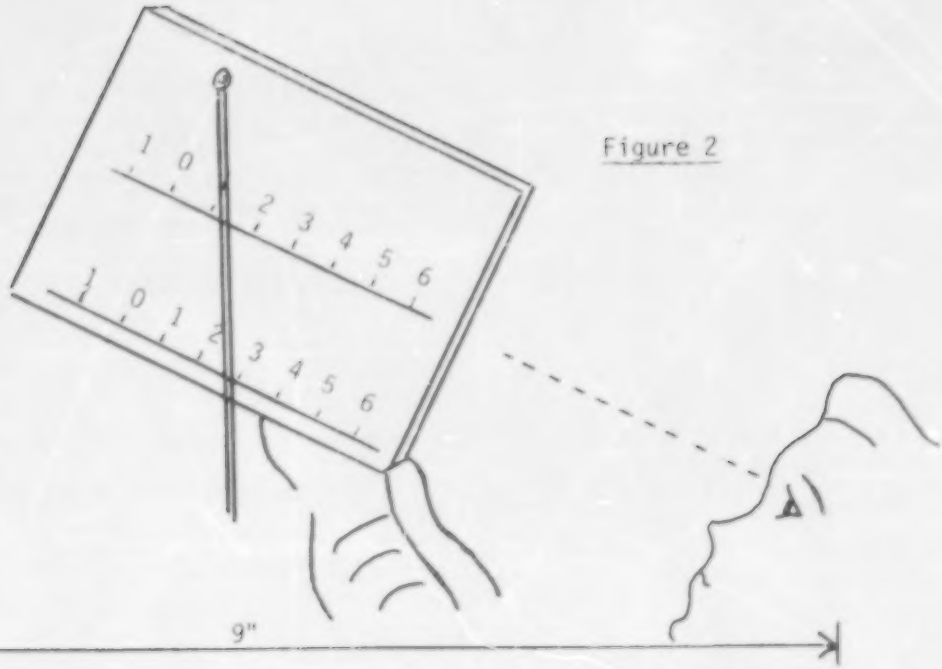


Figure 2

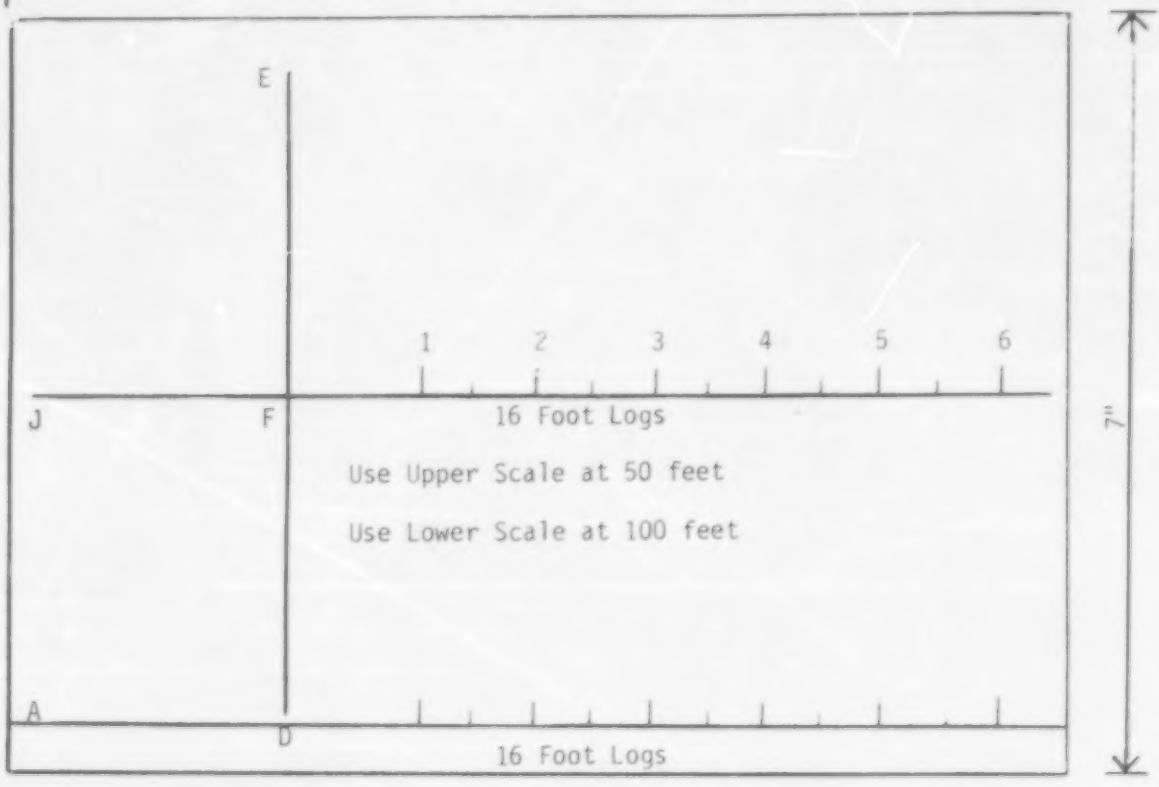


Figure 1

78

How to Use a Hypsometer

To measure the merchantable height of a tree, stand at a distance of 50 feet from the base of the tree. Hold the instrument in the right hand so that the wire pendulum swings freely, but very near the board as shown in Figure 2. Sight along the brads to the merchantable top of the tree as shown in Figure 3. With the left hand press the pendulum against the board without allowing it to change its position. Wherever the wire crosses the upper scale, the number of 16-foot logs contained in the tree is read. If the wire crosses the scale between two numbers, then read the scale to the nearest half log, such as 1½ logs, 2½ logs, etc. Now sight to the stump level of the tree and take another reading. If the pendulum hangs to the left of D (see Figure 2), that is, between A and D, add the amount read on the scale to the first reading. This will give the total merchantable height. Should the eye be below the stump height level, the wire will hang to the right of D, and then the amount of the second reading should be subtracted from the first reading.

Should the merchantable height be more than 3 logs, it is a good idea to stand 100 feet from the tree. Measuring the height at this distance works the same as explained above, except that the scale for a distance of 100 feet from the tree is used.

Figure 3. A hypsometer being used to measure the number of 16-foot logs in a tree.

The distance to stand from the tree may be determined by pacing, but it is a good idea to first pace the distance of 50 and 100 feet several times to find out how many steps or paces to take. It should be kept in mind that two steps make one pace.

Reference Sheet #8d

*TIMBER ESTIMATING PROCEDURE

Measure either the board-foot volume on a 1/5-acre plot or the cords on a 1/5-acre plot.

Estimating Board Feet

Visit a woodland where there are trees 9 inches or more in D.B.H. to estimate board feet. Note that although trees as small as 9 inches in D.B.H. are usually included in sawlog volume estimates, this does not mean that they should be cut for lumber. Observe that if they are straight, thrifty, well-formed, and free of serious rot, they should, as a rule, be left to grow to a larger size.

Follow the procedure explained below in estimating the board feet on a 1/5-acre plot. Let three persons work together. Have one pace distances, one measure tree heights and diameters, and the third record measurements on the record form found on Activity Sheet #25.

1. Lay out a 1/5-acre circular plot as follows: Note that a circular plot of this size has a radius of 52.7 feet. Drive a stake in the ground, or kick some dirt loose, to mark the center of the circle. Measure or pace out from the stake a distance of 52.7 feet in several directions to the circumference of the circle. Kick dirt loose at several points to mark the plot circumference. Pace the measured distance of 52.7 feet several times to find out the number of steps or paces to take if the radii distances are determined by pacing.

2. Measure the merchantable height and the D.B.H. of all the living trees 9 inches and over in D.B.H. Measure the merchantable height in terms of 16-foot logs to the nearest half log. Record all measurements as soon as they are made on the record form on Activity Sheet #25. Do not measure dead and cull trees. Note that a cull tree is one so defective that it will not yield saleable logs. Do not attempt to make deductions for crooks, rot, cracks, and other defects when trees are being measured. Observe that the way this can be done is discussed below.

3. Find the number of board feet in each tree from Table 1 after the trees have been measured. Add all the volumes to find the total for the 1/5-acre plot.

Note that the volume obtained above is a "gross" volume. Note that no allowance has been made for rot, crooks, cracks, and other defects usually found in sawlog trees. Find the "net" volume by making a deduction of 20 to 30 percent for old growth hardwood timber. Make a deduction of about 10 percent for younger and less defective hardwood, sawlog timber and pine sawlogs.

Note that in cruising large areas of timber, such as a forty or several forties, the timber on many 1/5-acre cruise plots has to be measured. Observe that these plots are located throughout the area according to some predetermined pattern. Note that the volumes on these plots are averaged so as to obtain average columns on a per acre basis. Explain that from these averages the volume for an entire area can be figured.

Explain that if it is desired to estimate the timber on a small woodland a few acres in size, every sawlog tree in the area should be measured. Say that this is called "100 percent cruise" and that is gives the best results for small areas.

Estimating Cords

Note that the procedure for estimating the number of cords on a 1/5-acre circular plot is the same as for board feet, except that different limits of merchantability are used. Observe that only those trees having a D.B.H. of 5 inches or more are usually included in cord estimates. Do not include cull and dead trees. Note that the merchantable height for most cord estimates is to a 4-inch top diameter, or to a lower point on the tree trunk where deformity or large branching may limit the saleability of products. Record the measurements as they are made on the form found on Activity Sheet #25. Note that the cord volume contained in trees of different sizes is given in Table 2. Explain that in estimating the cords in a stand of trees no deductions are made for tree defects; however, buyers of the prodcuts may deduct for defects not allowed by their specification.

*4-H Bulletin 132.1-C Forest Management, Michigan State University Cooperative Extension Service 4-H Youth Program.

Reference Sheet #8e
*BOARD FOOT VOLUME TABLE

D.B.H. (Inches)	Height in number of 16-foot logs per tree						
	1/2	1	1 1/2	2	2 1/2	3	3 1/2
	Volume in board feet - International 1/4 Inch Rule						
9	9	24	38				
10	17	39	53	68			
11	24	49	67	84			
12	30	57	80	100	115		
13	36	68	93	120	139		
14	42	79	110	140	163	181	205
15	50	92	128	160	188	214	241
16	59	105	147	180	213	247	278
17	67	120	168	207	246	283	319
18	74	135	188	235	278	320	360
19	83	152	212	265	314	361	405
20	92	170	236	195	350	402	450
21	102	190	263	329	390	448	502
22	112	209	290	362	430	494	555
23	123	231	318	397	471	544	610
24	133	252	346	431	521	594	665
25	146	276	378	465	558	646	726
26	158	300	409	508	604	698	786
27	173	324	443	553	654	755	852
28	187	348	478	597	705	812	918
29	194	378	515	542	758	873	990
30	220	408	552	687	811	934	1,061

*4-H Bulletin 132.1-C Forest Management, Michigan State University Co-operative Extension Service 4-H Youth Programs.

Reference Sheet #9a
*Log Scaling

Equipment needed: yard stick - log rule below. (Let the students make a scaling stick - see Reference Sheet #9b.)

Have the students work in groups of three. Let one student measure the log diameter, one student measure the log length, and one record the measurements. Note the three main steps involved in log scaling:

1. Measure the diameter of a log in inches, inside of the bark at the small end. Measure logs that are not round by taking the average of the short and long diameter. Record the measurements on the form on Activity Sheet #25.

2. Measure the length of the log in feet plus an allowance of 2 or 3 inches for trimming the lumber that is sawed from the log. Note that a 12-foot log must measure 12 feet plus trimming allowance. Observe that if it measures exactly 12 feet, it must be called an 11-foot log. Record the measurements.

3. Read the board-foot content of each log from the table.

Explain that scaling logs is not difficult. Note that many logs contain crooks, cracks, rot, and other defects, but a forester or scaler can estimate the amount to deduct for the different defects.

* The board foot content of logs according to the International Rule using a saw cutting 1/4-inch kerf

Diameter at top end of log, inside bark (inches)	Contents in board feet of logs having a length of -								
	8 ft.	9 ft.	10 ft.	11 ft.	12 ft.	13 ft.	14 ft.	15 ft.	16 ft.
6	10	10	10	10	15	15	15	20	20
7	10	15	15	15	20	20	25	25	30
8	15	20	20	25	25	30	35	35	40
9	20	25	30	30	35	40	45	45	50
10	30	35	35	40	45	50	55	55	65
11	35	40	45	50	55	65	70	75	80
12	45	50	55	65	70	75	85	90	95
13	55	60	75	75	85	90	100	105	115
14	67	70	80	90	100	105	115	125	135
15	75	85	95	105	115	125	135	145	160
16									
16	85	95	110	120	130	145	155	170	180
17	95	110	125	135	150	165	180	190	205
18	110	125	140	155	170	185	200	215	230
19	125	140	155	175	190	205	225	245	260
20	135	155	175	195	210	230	250	270	290

21	155	175	195	215	235	255	280	300	320
22	170	190	215	235	260	285	305	330	355
23	185	210	235	260	285	310	335	360	390
24	205	230	255	285	310	340	370	395	425
25	220	250	280	310	340	370	400	430	460
26	240	275	305	335	370	400	435	470	500
27	260	295	330	365	400	435	470	505	540
28	280	320	365	295	430	470	505	545	585
29	305	305	385	425	465	505	545	590	630
30	325	370	410	455	495	540	585	630	675

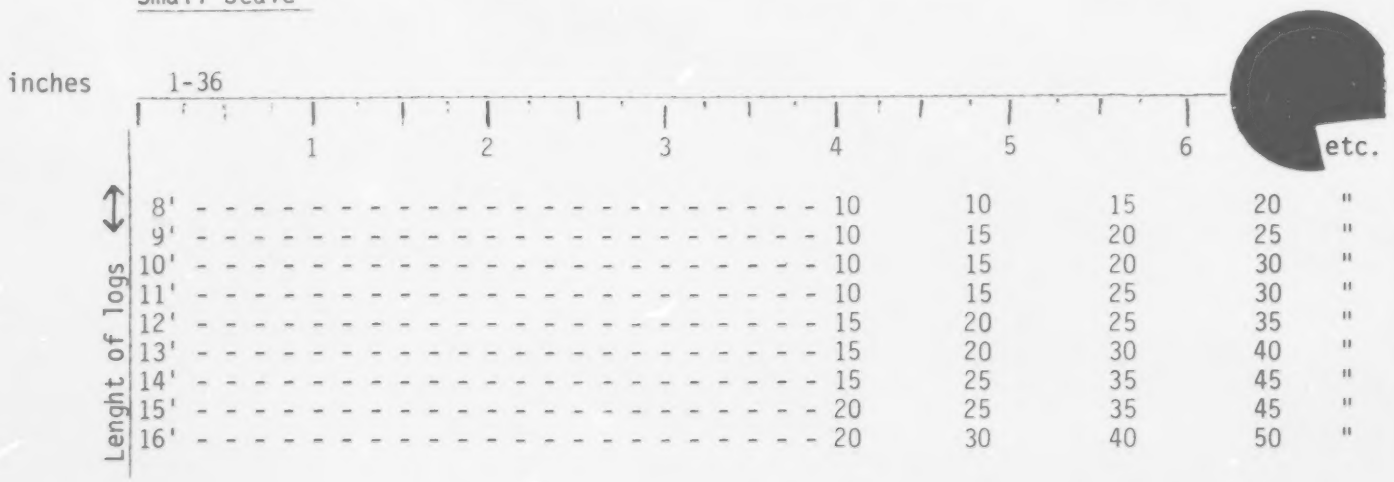
*4-H Bulletin 132. 1-C Forest Management, Michigan State University Co-operative Extension Service 4-H Youth Programs.

To make a scaling stick

Note the equipment needed: a yard stick, tag board, the log rule listed on Reference Sheet #9a, and a felt tip marker.

1. Cut out a sheet of tag board 36" x 3".
2. Mark 36" across the top.
3. Transfer the information from the log scaling table to the scaling ruler. (See diagram below.)
   a. Note that inches on the ruler correspond to the inches in the column on the right of the scaling table on Reference Sheet #9a.
   b. List the board feet in a column on the left edge of the ruler.
   c. Transfer the rest of the information from the scaling log to the ruler very carefully.

Small Scale



Activity Sheet #1

Name_____

Date_____

I PLANTED A TREE---

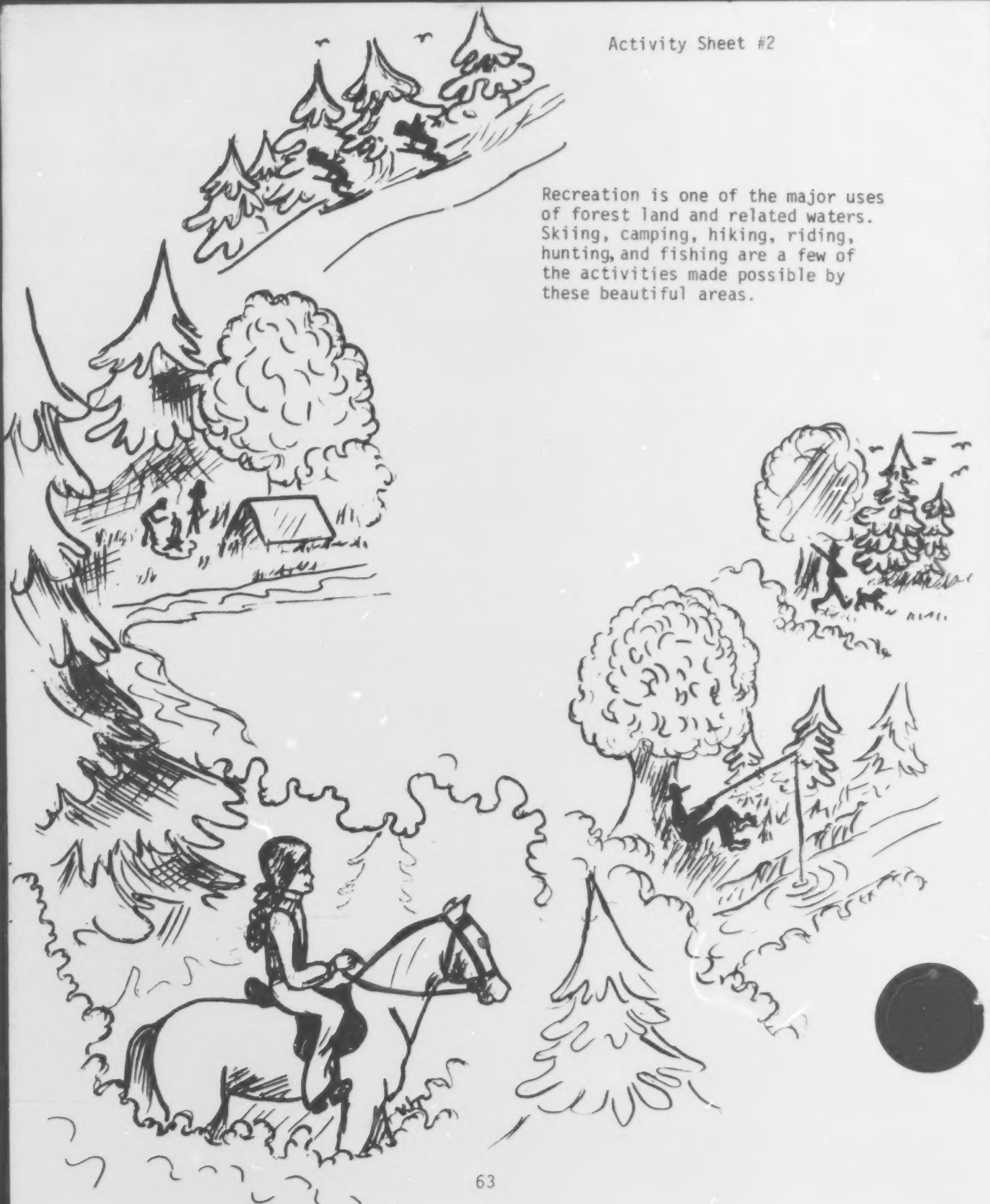
Today I planted a tree so fair
To stop erosion and make fresh air
To leaf in spring and fade in fall
To grow up slowly and straight and tall
To send out moisture into the air
To gather snow on branches bare
To hold a nest for a cooing dove
To offer shade from the sun above
To make a home for a busy squirrel
To hold a swing for a boy or girl
To make the boards for buildings tall
To make the blocks for children small
To make the books for students bright
To make the pencils with which they write
To make a ship for the seven seas
To make a hive for the honey bees;

I had these dreams I longed to share---
Today I planted a tree so fair.

----Charlotte Groff

Activity Sheet #2

Recreation is one of the major uses of forest land and related waters. Skiing, camping, hiking, riding, hunting, and fishing are a few of the activities made possible by these beautiful areas.



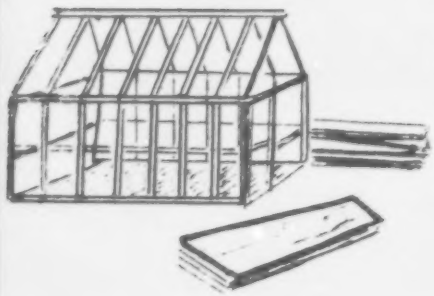
While it is growing wood, the forest furnishes the natural environmental elements of food, water, and cover for wildlife. Where trees have been harvested in patches, shrubs, bushes, and seedlings spring up. Birds and animals find food and cover along these edges.

Trees purify water, protect the watershed (the areas drained by a river or a river system), control erosion, and conserve soil. Three-fourths of the nation's water comes from the forested third of the country. Trees, cushioning the impact of rainfall on forest floors, regulate the water's flow and form a necessary link in the earth's water system.

Trees reduce highway noise. Solid belts of trees, may produce up to 50% more quiet along roads.

Trees purify the air. Trees convert carbon dioxide to wood and give off oxygen. Trees also cool and humidify the air through transpiration, the process of releasing moisture through leaves or needles into surrounding air. On a hot day a young tree can produce the same cooling effect as ten (10) air conditioners running twenty (20) hours. The air can be as much as twenty (20) degrees cooler under a tree.

Activity Sheet #5
Forest Products



LUMBER

Books, desks, and pencils are made from wood. Even schools and homes may be made of it.

Today not all things made from wood are easy to recognize. The telephone receiver has been shaped out of a clay-like material which is made from sawdust.

Wood is very important to everyday life. Newspapers, books, writing paper, and grocery bags are a few of the things made from pulpwood. Homes, telephone poles, baseball bats, and fences are made from woods. Fabric dyes, glues, soaps, drugs, fuels, explosives, antifreeze, plastics, and varnishes are just a few of the many use made of forest products.

Just look around. How many things are made from wood?

PAPER

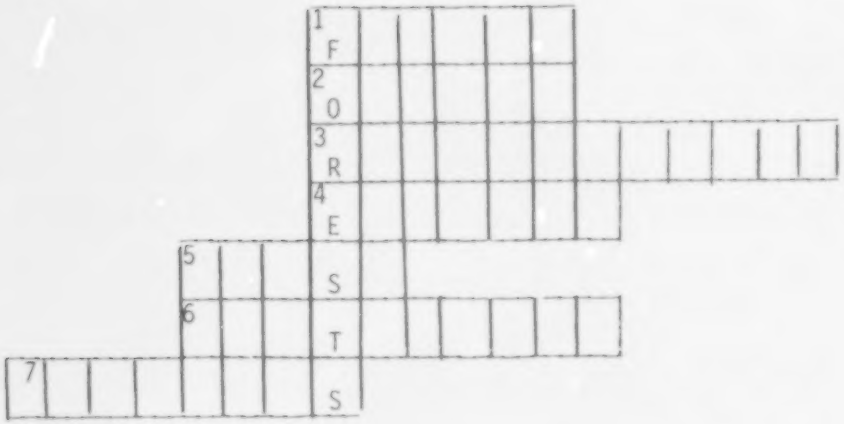
DISTILLATION
PRODUCTS

CHEMICALS

Activity Sheet #6

Name _____

Date _____



1. Your _____ could depend on today's trees.
2. Trees produce _____ which we need to live.
3. Hunting, riding, and hiking are few of the _____ activities we enjoy in the forest.
4. The roots of the trees help prevent _____.
5. Trees help reduce _____ pollution.
6. Forests provide _____ for wildlife.
7. The forest provides many useful _____.

Activity Sheet #7

Name_____

Date_____

Uses of Forest Products
How many can you find?

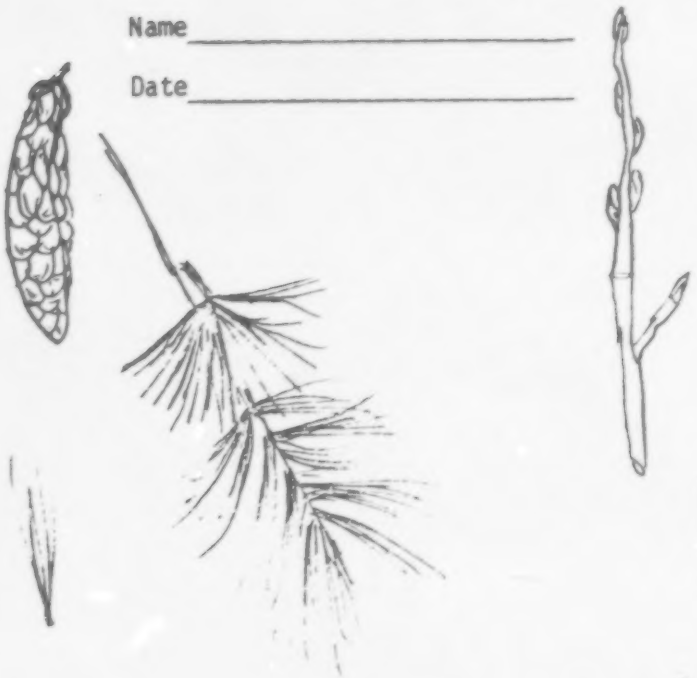
F A B R I C H D R U G S O P N X
U S A Z X N P Y F X L H T A E P
R X T B P J E E L P E N A D W P
N Y S O A P N S O L V E N T S A
I O J X I D C B O B A G N G P P
T A R E N Z I T R A R K I L R E
U R S S T I L Y S D N O N U I R
R A Y O N P L A S T I C B E N T
E E X P L O S I V E S C R A T E
J C H E M I C A L S H E L L A C

bag
bats
boxes
chemical
crate
drugs
dyes
explosives
fabric
floors
furniture
glue
newsprint
paint
paper
pencil
plastic
rayon
shellac
soap
solvents
tannin
tar
varnish

Activity Sheet #8

Name_____

Date_____



A._____

This is the state tree of Michigan. There are five needles in each bundle.

B._____

The leaves on this tree are round and "quake" in the slightest breeze. Deer and beaver enjoy this tree. It is excellent for pulpwood.

C._____

This is one of the largest and most valuable trees in Michigan. Flooring, whiskey barrels, and furniture are some of its uses. Its leaves are 5 to 9 incnes long.

D._____

The leaves resemble the sugar maple, but the bark is darker with leaves that droop and are 3-lobed. It is marked as hardwood.

What is a tree? It is a large green plant that needs space to survive. It depends on the soil for its water and nutrients. The roots hold the tree firmly in the soil. The leaves make sugar for the tree by using carbon dioxide from the air and water that has traveled up from the roots. The sunshine furnishes the energy for this process called photosynthesis.

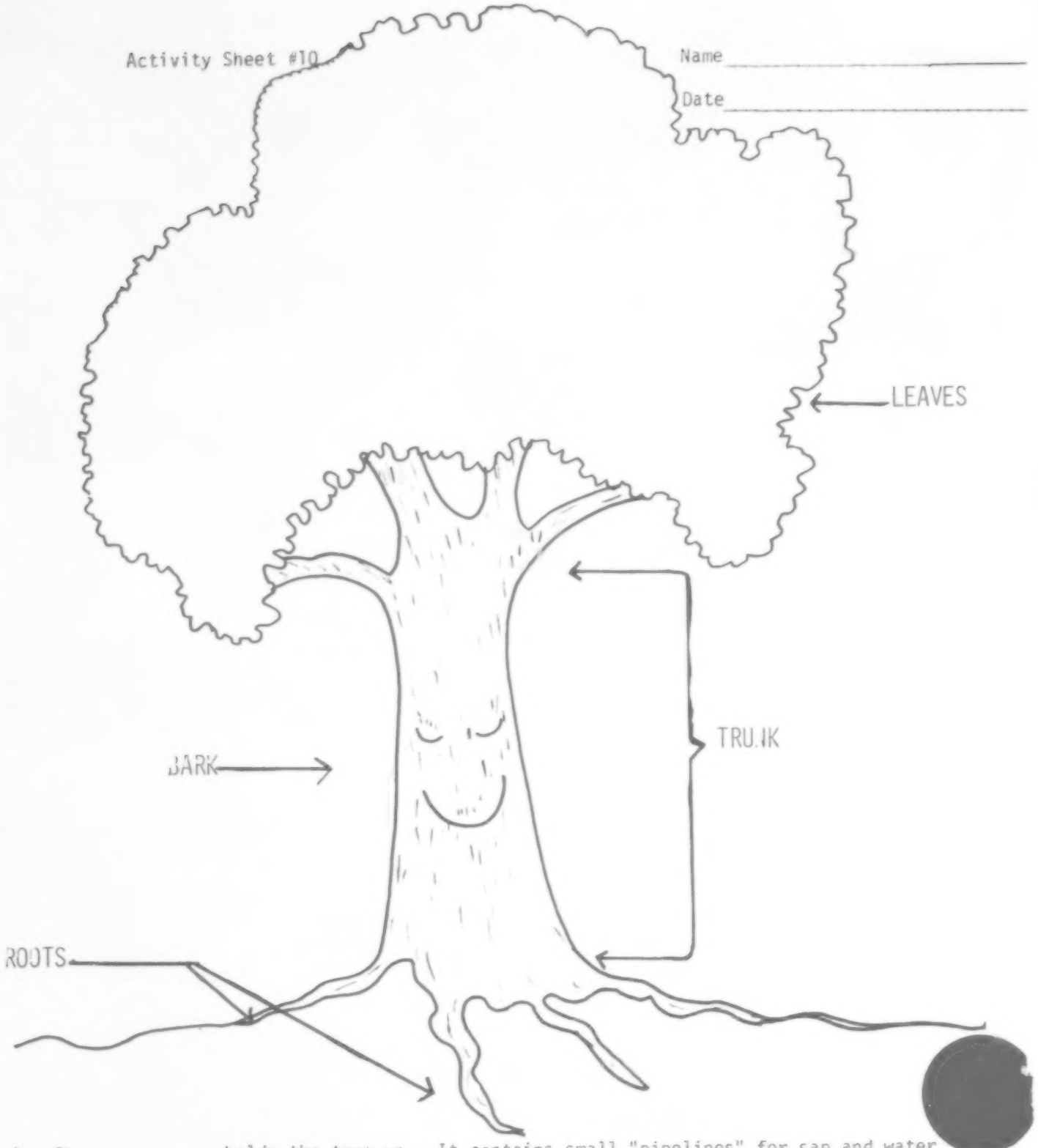
Foresters must know a lot about trees. They must be able to supervise the planting of seeds and seedlings. They must be able to help a tree farmer with any of the problems that arise in the growing of trees. They must be able to recognize the needs of trees.

Name at least three things needed by trees to survive.

Activity Sheet #10

Name _____

Date _____



1. The _____ holds the tree up. It contains small "pipelines" for sap and water.
2. The _____ hold the tree in place and absorb moisture and minerals from the soil.
3. The _____ take carbon in the form of cabon dioxide from the air. They take energy from the sunlight, and make food from it for the tree to use.
4. The _____ protects the tree.

Activity Sheet #11

Name _____

Date _____

A

Type of Soil	Predictions	Growth Record - inches each day	Conclusions

Name _____

Date _____

B

Experiments	1.	2.	3.	4.
Predictions				
Conclusions				

Activity Sheet #12

Name_____

Date_____

WAS or WERE

1. Today _ _____ Ann's first day on the job.

2. She _____ assigned the job of scaling logs.

3. The men _____ not sure a girl could do forestry work.

4. Ann soon found that the forester's work _____ not easy.

5. Supervising the planting of trees _____ only one of the skills needed.

6. Ann found there _____ many things she would need to learn even though she had finished college.

SAW, SEE or SEEN

1. The other foresters soon _____ that Ann was a good worker.

2. Ann _ _____ many chances to improve her skills.

3. Ann had never _ _____ so many beautiful trees.

4. Ann could _____ that the other foresters were proud of her.

5. The foresters had never _____ a worker more willing to try than Ann.

6. Ann could _____ many happy days ahead.

Activity Sheet #13

Name_____

Date_____

Read these sentences and then arrange the words in the correct sequence.

1. white pine The Michigan tree of is the state

_____

_____

2. the to earth Nearly all trees that fall seeds have

_____

_____

3. covered by forest that was once means replanting trees on land Reforesting

_____

_____

4. a tree nursery Tree seeds planted first are in

_____

_____

5. are replanted seedlings reach the right height When the tree they

_____

_____

6. trees a tree farmer's inspects A forester

_____

_____

Activity Sheet #14

Name_____

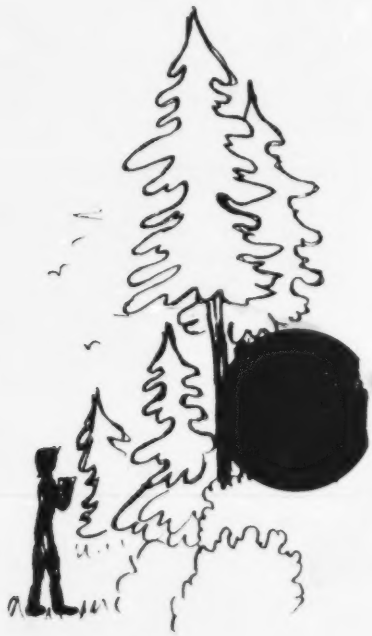
Date_____

Foresters wage constant warfare against the insects and diseases that kill more trees than fire does. One of the big problems of controlling insects and disease is that sometimes they are hard to detect until it is too late.

Industrial foresters keep a close watch on the health of their trees. Infected trees are quickly removed.

Foresters are alarmed when the insect population suddenly grows to epidemic proportions. Whole forests have been destroyed by unchecked swarms of insects.

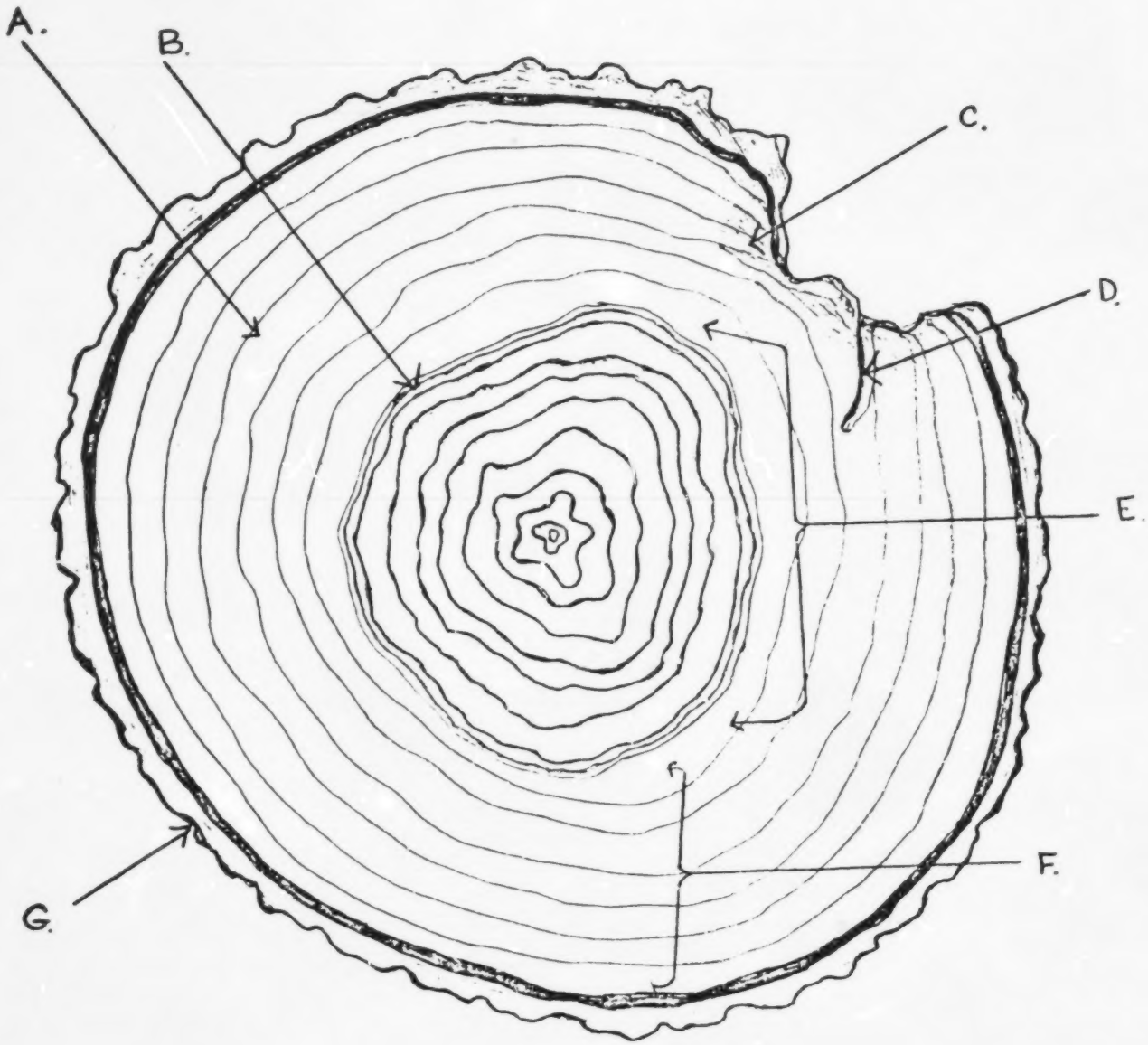
Normally, insects are kept under control by birds, parasites, animals, or food shortage. But, an imported insect may seriously upset the local balance of nature.



Activity Sheet #15a

Name _____

Date _____



When a tree is cut down, people can read its life story from rings in the trunk. A dark ring for summer and a light ring for spring show a year's growth. Foresters read this story from a living tree by boring out a small core.

Activity Sheet #15b

Name_____

Date_____

Study the drawing of a cross section of a tree on Activity Sheet #15a. Identify each part of this cross section by placing the correct letter in front of each statement.

1. _____BARK - protects the tree

2. _____SAPWOOD - carries sap from the roots to the leaves

3. _____HEARTWOOD - was sapwood, but now gives the tree strength

4. _____Growth slowed during a dry year, or it was shaded from the sun by other trees.

5. _____Insect damage

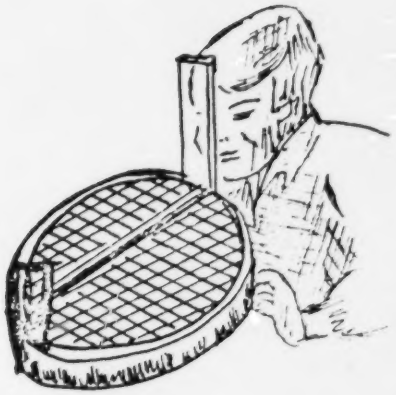
6. _____Decay

7. _____Growth speeded up during a wet year, or the surrounding trees were thinned.

Activity Sheet #16

Name_____

Date_____



One of the worst enemies of the forest is fire. Fire is fearsome, fast, and fatal. Fire destroys millions of acres of trees each year. It kills more than trees and plants. The raging flames kill animals and many birds. It destroys their homes and food supplies.

A forest fire destroys soil as well as many species of trees.

Fighting a fire requires teamwork and modern equipment. Rangers in towers are constantly watching for fires. Using an alidade, the observer quickly locates the exact location of the fire and telephones this information to the district ranger. Observers in helicopters fly over the fire to note its size and behavior. Fire fighters and supplies are quickly transported to the fire.

Would you want to fight a forest fire? Describe what you might think, feel, see, or do if you were a "smoke jumper" fighting a forest fire.

_____

_____

_____

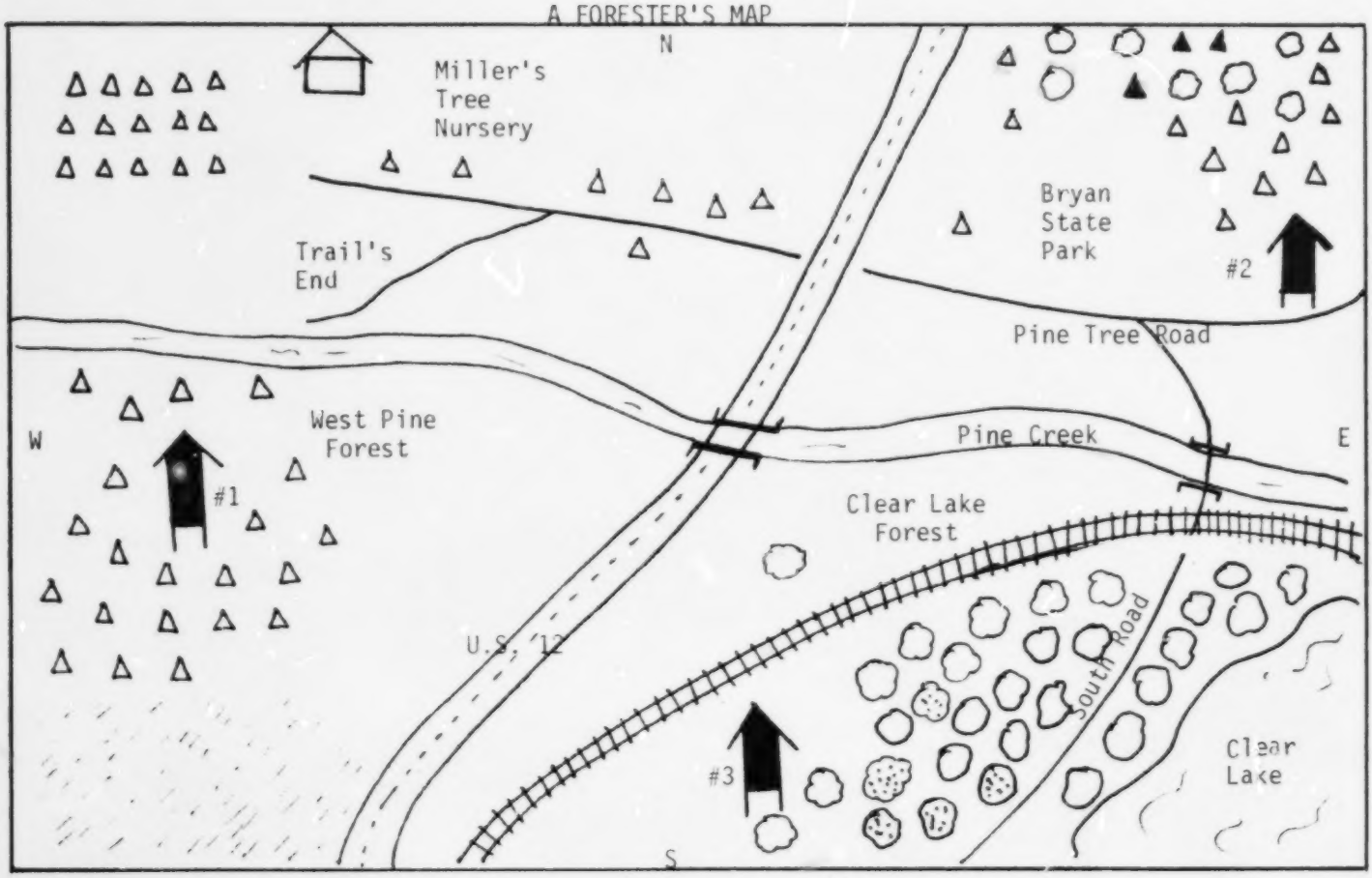
_____

Activity Sheet #17a

Name _____

Date _____

A FORESTER'S MAP



Conifer

Deciduous

Ranger Station and
Look-out Tower

Diseased Trees

Insect damage

Paved Road

Un-paved Road

Burned-over Area

Activity Sheet #17b

Name_____

Date_____

Study the map carefully.

1. How many look-out towers are indicated on this map?_____

2. Which state park or forest shows insect damaged trees?_____

_____

3. Which state park or forest shows diseased trees?_____

_____

4. Which ranger station is located in Clear Lake Forest?_____

_____

5. Does the railroad cross Pine Creek?_____

6. What type of trees are grown in Miller's tree nursery?_____

_____

7. How many bridges cross Pine Creek?_____

8. Starting at tower number 2, in which direction would you have to travel to reach Miller's tree nursery?_____

9. Near which forest may there have been a forest fire?_____

_____

10. Which look-out tower is the farthest South?_____

_____

Activity Sheet #18

Foresters must be able to handle such jobs as surveying and mapping.

The most important of all tools used by the surveyor is the transit. Has anyone ever seen a transit?

Angles and triangles play a very important part in the work of the surveyor. He/she must have a thorough knowledge of geometry and trigonometry. He must be able to use delicate instruments with precision and accuracy.

It takes more than a college education to make a good forester. A forester must have a deep love for the outdoors and for animals. A forester must have the ability and health to "rough it". He/she must be patient and get along with all kinds of people. He/she must be able to keep his head in emergencies. Do all people have these qualities?

Activity Sheet #19a

Name _____

Date _____

Forest of the United States

Forests cover about a third of the U.S. or 775,000 acres. About two-thirds of this land produces valuable timber. The rest is used for parks, military reservations, and other purposes such as wildlife sanctuaries.

The United States has more kinds of trees than any other country. The United States has several kinds of forests.

The Northern Forest produces about a tenth of the lumber and a fifth of the pulpwood produced in the United States. The chief trees in this area are the evergreens like the white pines, spruce, hemlock, and cedar. Some important hardwoods in this forest are the oaks, beech, birch, and maple.

The Central Hardwood Forest was once the largest forest in America. Many trees have been removed to make room for the growing population. The main trees are the hardwoods. Some of these are the oaks, gum, yellow-poplar, hickory, walnut, and magnolia.

The Southen Forest supplies nearly three-fifths of the nations; pulpwood. It makes up about one-third of the whole forest of the United States. Southern pine and cypress are among its most important trees. Oaks, yellow-poplar, walnut, and gum are important hardwood trees in this area.

The Rocky Mountain Forest is the home of such conifers as ponderosa pine, Idaho white pine, sugar pine, Douglas fir, hemlock, spruce, the white firs, and lodgepole pine.

The Pacific Coast Forest produces almost a third of the nation's lumber, a fifth of the pulpwood, and all the fir plywood. It also contains the famous California redwoods.

The Tropical Forest includes only a small area. Mahogany, Mangroves, and bay trees grow here.

Activity Sheet #19b

Name_____

Date_____

After reading about the "Forest of the United States" and studying the map on Activity Sheet #19c, answer the following questions and complete the activities.

1. Which forest contains the California redwood?_____

_____

2. Which forest supplies nearly three-fifths of the nation's pulpwood?

_____

3. Look at the map. Excluding Hawaii and Alaska, which forest covers the smallest area?_____

4. Which forest covers the largest area?_____

5. Which forest extends up into Maine?_____

6. Which two forests lie completely West of the Mississippi River?

_____

7. What body of water borders the Southern Forest on the East?_____

_____

8. What body of water borders the Tropical Forest on the West?_____

_____

9. What forest almost surrounds the Great Lakes?_____

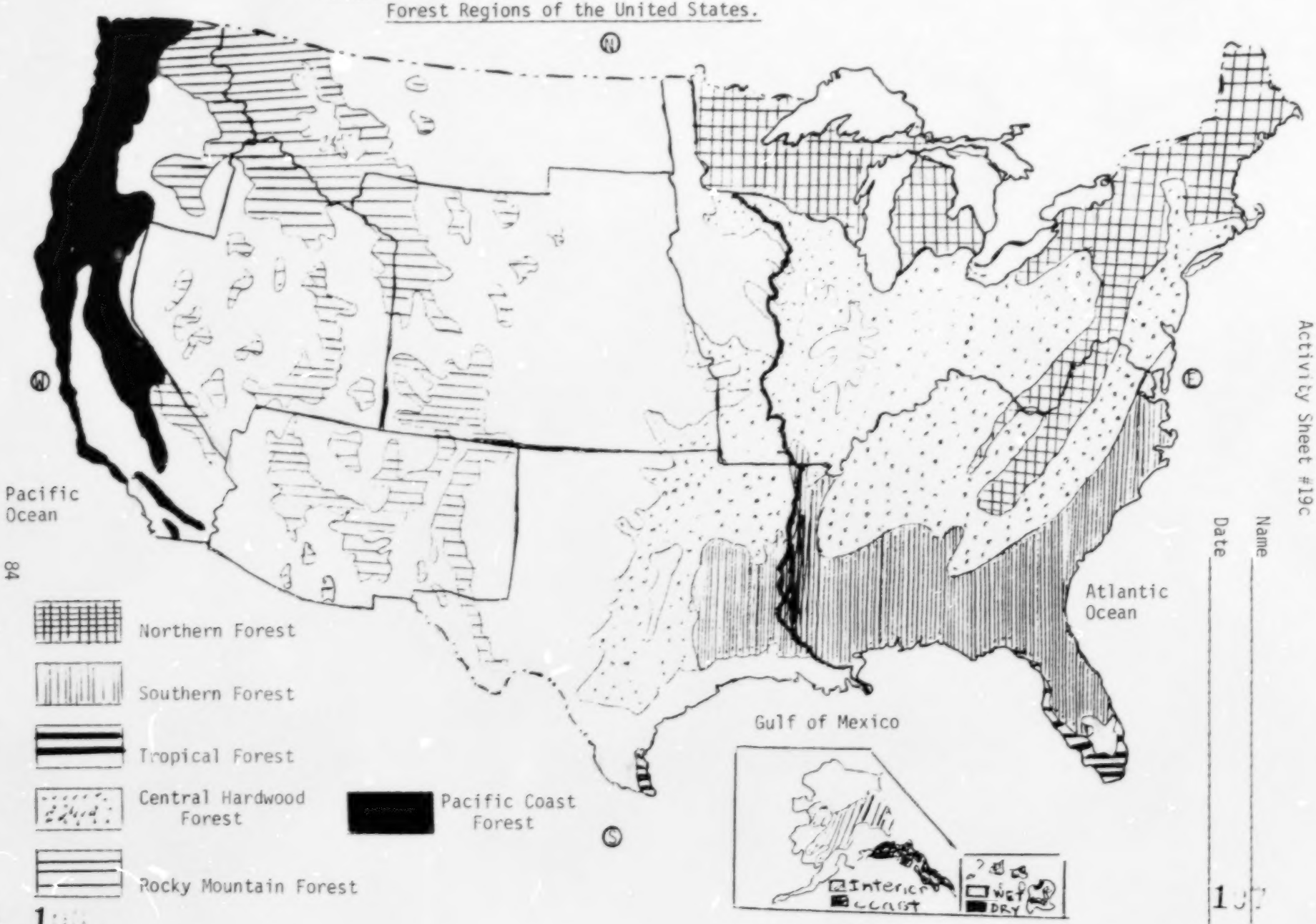
_____

10. What three forests touch the Canandian border?_____

_____

Canada

Forest Regions of the United States.



Activity Sheet #19c

Name

Date

Activity Sheet #20

A forester performs many duties. He/she measures, selects, and marks trees for cutting. He/she plans and supervises the management of forest areas. He/she must be able to determine the volume of trees in an area and estimate how fast they are growing.

The forester is a key person in the forest industry, but he/she is one member of a large team of different specialists.

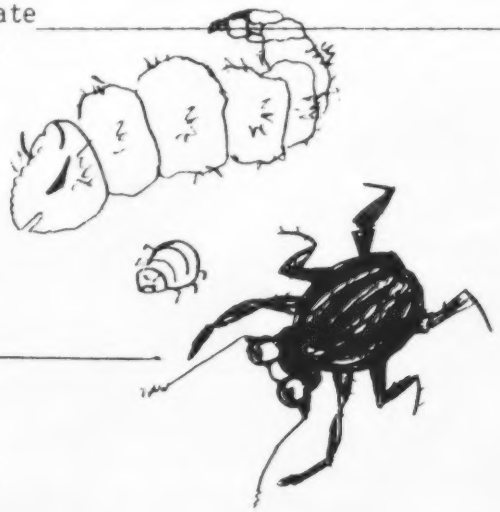
Activity Sheet #21

Name _____

Date _____

Who are these enemies?

1. _____



2. _____

3. _____

4. _____

5. _____

6. _____

Activity Sheet #22

Name _____

Date _____

Scrambled Words

1. EDSE _____
2. INEP _____
3. ETSRFOER _____
4. RKAP _____
5. STENCIS _____
6. GLGORE _____
7. ODWO _____
8. CSVLTURUIIEL _____
9. URLBEM _____
10. GDELESNI _____

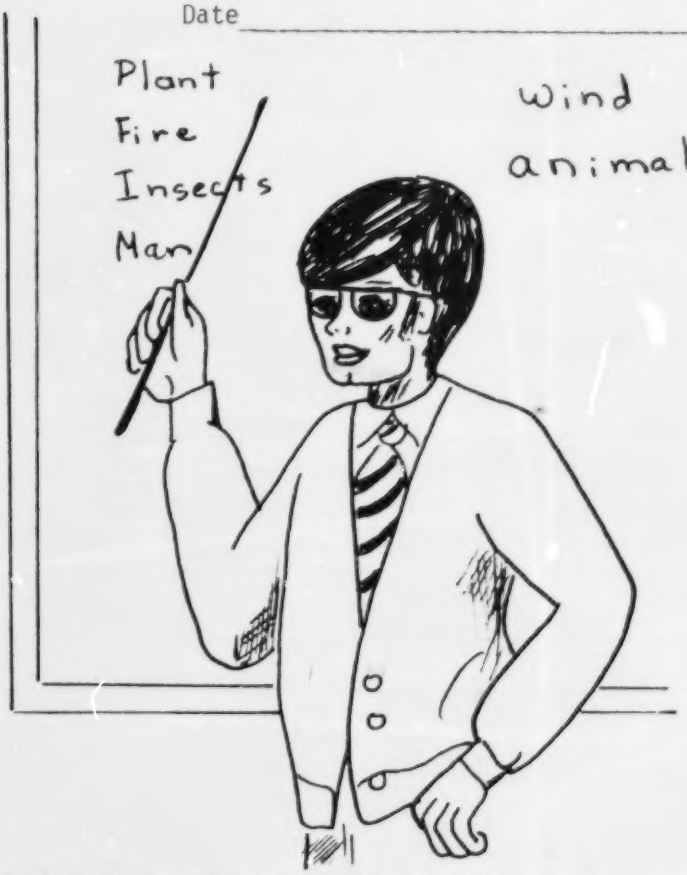
Forester	Seed	Seedling
Wood	Park	Pine
Logger	Insects	Lumber
Silviculture		

Name _____

Date _____

Some foresters teach in universities or conduct adult education programs. Some foresters do research work. They study and investigate better ways of growing trees, fighting insects, fighting plant diseases, and making useful products from trees.

A person must go to college to become a forester. But there are many jobs that are performed in the forest that do not require college training. Do you think you would enjoy working in a forest?



Here are some words a forester would need to know. Do you know what they mean?

1. Coniferous _____
2. Deciduous _____
3. Alternate branching _____
4. Opposite branching _____
5. Compound leaf _____
6. Simple leaf _____
7. Lobed _____

("Mr. Webster" can help you!)

Activity Sheet #24

Name_____

Date_____

Log Scaling

Scale these "made-up" logs if no real logs are available.

	Diameter in inches small end	Length in feet
1.	6	10
2.	12	14
3.	10	10
4.	15	16
5.	20	12
6.	24	10

Find the meaning of these words:

gross_____

volume_____

net volume_____

Activity Sheet #25

Name _____

Date _____

TIMBER ESTIMATING AND LOG SCALING RECORD FORM

LOG SCALING RECORD

Log No.	Kind of Log	Length of Log (ft.)	Diameter of log, small end inside bark (in.)	Board feet Inter ¼" Rule
1				
2				
3				
4				
5				
6				
Total gross board foot volume				

TIMBER ESTIMATING RECORD

Tree No.	Kind of tree	D.B.H. (Inches)	Merch. height-No. of 16-ft. logs or 8-ft bolts	Volume - cords or board feet
1				
2				
3				
4				
5				
6				
7				
8				
Total gross volume				
Net volume				